ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

CIVIL ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

FOR B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUA, Ananthapuramu, Approved by AICTE, Programs Accredited by NBA, Accredited by NAAC with 'A' grade)
SREE SAINATH NAGAR, A. Rangampet -517102:: NEAR TIRUPATI (A.P)

VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

- To foster intellectual curiosity, pursuit and dissemination of knowledge.
- To explore students' potential through academic freedom and integrity.
- To promote technical mastery and nurture skilled professionals to face competition in ever increasing complex world.

QUALITY POLICY

Sree Vidyanikethan Engineering College strives to establish a system of Quality Assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

DEPARTMENT OF CIVIL ENGINEERING

VISION

To become a leading centre of excellence in the country in Civil Engineering education through teaching, research, consultancy and public service for technical development in a knowledge society.

MISSION

- Inspire the civil engineers of tomorrow to take on the challenges of creating and sustaining the built environment that support our society.
- Nurture these civil engineers with fundamental engineering knowledge, a broad set of skills, and an inquisitive attitude for creating innovative solutions to serve industry and community through contemporary curriculum, congenial learning environment, pertinent research, industry-institute interaction, mentoring, co-curricular and extra-curricular activities.
- Encourage faculty and staff to excel in their respective fields and demonstrate the best of their abilities by way of continuing education, research and consultancy.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (CE) will:

1. Pursue higher education in civil engineering or other fields of engineering or management or other areas of interest.
2. Address the contemporary issues in Civil Engineering or related field and provide appropriate solutions through professional career in industry/teaching/research.
3. Engage in 'technology innovation and deployment' and engineering system implementation, as an entrepreneur.
4. Exhibit leadership qualities, participate in continuing education programmes for lifelong learning and contribute individually and as a member in multidisciplinary teams to meet social and ethical constraints.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (CE) program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Engineering knowledge**)
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem analysis)**
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Design/development of solutions)**
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems**)

5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **(Modern tool usage**)

6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. (**The engineer and society**)

7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development). **(Environment and sustainability)**

8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (**Ethics**)

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work**)

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication**)

11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project management and finance**)

12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning**)

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (CE) program will be able to:

PSO1: Plan, draw, analyze, design, construct, valuate, manage, maintain, retrofit and rehabilitate civil engineering systems and processes by applying suitable materials, tools and techniques.

PSO2: Identify minerals, rocks, structural geology problems and understand geological maps; characterize soil; choose foundations; select ground improvement techniques; and plan and design transport systems.

PSO3: Perform land survey; plan, design, construct, maintain and manage water resources systems; analyze water and wastewater; manage solid waste; plan, design and execute environmental systems and processes.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to J.N.T. University Anantapur, Ananthapuramu)

ACADEMIC REGULATIONS (SVEC-19)

CHOICE BASED CREDIT SYSTEM

B.Tech. Regular Four Year Degree Program

(For the batches admitted from the academic year 2019–20)

&

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2020-21)

For pursuing four year undergraduate Degree Program B.Tech offered by Sree Vidyanikethan Engineering College under Autonomous status and herein after referred to as SVEC:

1. Applicability: All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2019-2020 onwards. Any reference to "College" in these rules and regulations stands for SVEC.

2. Extent: All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. It shall be ratified by the Academic Council in the forthcoming meeting. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission:

3.1. Admission into First Year of Four Year B.Tech. Degree Program in Engineering:

3.1.1. Eligibility: A candidate seeking admission into the First Year of four year B.Tech. Degree Program should have:

Passed either Intermediate Public Examination (I.P.E.) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional courses (or any equivalent examination recognized by JNTUA, Ananthapuramu) for admission as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

3.1.2. Admission Procedure: Admissions shall be made into the first year of four year B.Tech. Degree Program as per the stipulations of APSCHE, Government of Andhra Pradesh:

(a) By the Convener, EAMCET, (for Category-A Seats).

(b) By the Management (for Category-B Seats).

(c) By the Management (for 15% Supernumerary Quota) for Persons of Indian Origin (PIO)/Foreign Nationals (FN)/ Children of Indian Workers in Gulf Countries/ Overseas Citizen of India (OCI)

3.2. Admission into the Second Year of Four year B.Tech Degree Program in Engineering (Lateral Entry).

3.2.1. Eligibility: A candidate seeking admission into the Second Year of four year B.Tech. Degree Program (Lateral Entry) should have:

(i) Passed Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by JNTUA, Ananthapuramu).

(ii) Candidates qualified in ECET and admitted by the Convener, ECET. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained.

3.2.2. Admission Procedure: 10% of the sanctioned strength in each Program of study as lateral entry students or as stipulated by APSCHE shall be filled in by the Convener, ECET.

4. Programs of study offered leading to the award of B.Tech. Degree:

Following are the four year undergraduate Degree Programs of study offered in various branches in SVEC leading to the award of B.Tech (Bachelor of Technology) Degree:

1) B.Tech (Civil Engineering)

2) B.Tech (Computer Science & Engineering)

3) B.Tech (Computer Science & Systems Engineering)

4) B.Tech (Electrical & Electronics Engineering)

5) B.Tech (Electronics & Communication Engineering)

6) B.Tech (Electronics & Instrumentation Engineering)

7) B.Tech (Information Technology)

8) B.Tech (Mechanical Engineering)

5. Duration of the Program:

5.1 Minimum Duration: The program shall extend over a period of four years leading to the Degree of Bachelor of Technology (B.Tech) of the JNTUA, Ananthapuramu. The four academic years shall be divided into eight semesters with two semesters per year. Each semester shall normally consist of 21 weeks (Minimum of 90 working days) having - Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), Choice Based Credit System (CBCS) and Credit Based Semester System(CBSS) as suggested by UGC and Curriculum/ Course Structure as suggested by AICTE are followed. Provision is made for lateral entry admission of students into the Second Year of the program in all the branches of study and they shall be required to satisfy the conditions of admissions thereto prescribed by the JNTUA, Ananthapuramu and Government of Andhra Pradesh.

5.2 Maximum Duration: The student shall complete all the passing requirements of the B.Tech degree program within a maximum duration of 8 years (6 years for lateral entry), these durations reckoned from the commencement of the semester to which the student was first admitted to the program.

6. Structure of the Program:

Each Program of study shall consist of:

(i) HS (Humanities and Social Sciences) Courses

(ii) BS (Basic Sciences) Courses

(iii) ES (Engineering Sciences) Courses

(iv) PC (Professional Core) Courses

(v) PE (Professional Electives)

(vi) OE (Open Electives) Courses

(vii) Mandatory Courses (MC)

(viii) Audit Courses (AC)

(ix) Projects (PR) (Socially Relevant Projects, Internship, Project Work)

S.No	Course Category	Course Type	No. of Credits
1.	HS – Humanities and Social Sciences	Humanities, Social Sciences and Management.	11
2.	BS – Basic Sciences	Mathematics, Physics and Chemistry Courses, etc.	22
3.	ES – Engineering Sciences	Fundamental Engineering courses.	22-23
4.	PC – Professional Core	Core courses related to the Parent Discipline/ Branch of Engg.	60-61
5.	PE – Professional Electives	Elective courses related to the Parent Discipline/ Branch of Engg.	15
6.	OE – Open Electives	Electives from other technical and /or emerging subjects	15
7.	PR - Projects	Socially Relevant Projects, Internship, Project Work	14
8.	MC - Mandatory Courses	Induction Program, Environmental Science, Constitution of India, Indian Traditional Knowledge	--
9.	AC - Audit Courses	Skill Development / Value Added Courses.	--

Contact Periods:

The contact periods per week are assigned depending on the complexity and volume of the course.

7. Credit Courses:

All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Course in a L: T: P: C (Lecture Hours: Tutorial Hours: Practical Hours: Credits) Structure, based on the following general pattern.

- **Theory Courses:** One Lecture Hour (L) per week in a semester: 01 Credit
- **Practical Courses:** One Practical Hour (P) Per week in a semester: 0.5 Credit
- **Tutorial:** One Tutorial Hour (T) Per week in a semester: 01 Credit
- **Mandatory Courses:** No **CREDIT** is awarded.
- **Audit Courses:** No **CREDIT** is awarded.
- **Open Elective** (MOOC): 03 Credits

Student activities like NCC, NSS, Sports, Study Tour and Guest Lecture etc. shall not carry ANY Credits.

For Socially Relevant Projects, Internship and Project Work where formal contact periods are not specified, credits are assigned based on the complexity of the work to be carried out.

The four year curriculum of any B. Tech Program of study shall have a total of **160** credits. However the curriculum for students admitted under lateral entry shall have a total of **118** credits.

8. Choice Based Credit System (CBCS):

Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:

- Student centred learning
- Students to learn courses of their choice
- Interdisciplinary learning

A Student has a choice of registering for courses comprising program core, professional electives, open electives, MOOC courses, value added / Skill based courses. Besides, choice is also offered to students for registering courses to earn Minor in Engineering/Honors degree.

9. Course Enrollment and Registration

9.1 Each student, on admission shall be assigned to a Faculty Advisor (Mentor) who shall advice and counsel the student about the details of the academic program and the choice of courses considering the student's academic background and career objectives.

9.2 Each student on admission shall register for all the courses prescribed in the curriculum in the student's first and second Semesters of study. The student shall enroll for the courses with the help of the student's Faculty Advisor (Mentor). The enrollment for the courses from II B.Tech I Semester to IV B.Tech I Semester shall commence 10 days prior to the last instructional day of the preceding semester for registration process. If the student wishes, the student may drop or add courses (vide clause 8) 10 days prior to commencement of the concerned semester and complete the registration process duly authorized by the Chairman, Board of Studies of concerned department.

9.3 If any student fails to register the courses in a semester, he shall undergo the courses as per the program structure.

9.4 After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the Semester-end Examinations.

9.5 Elective courses shall be offered by a Department only if a minimum of 40 students register for that course.

10. OPEN ELECTIVE (MOOC)

OPEN ELECTIVE (MOOC) is an online course aimed at unlimited participation and open access via the web.

10.1 A Student is offered an Open Elective (MOOC), in the IV B.Tech I-Semester, and is pursued through Massive Open Online Course (MOOC) platforms. The duration of the MOOC courses shall be for a minimum period of 08 weeks.

10.2 The student shall confirm registration by enrolling the course within 10 days prior to the last instructional day of the III B.Tech II-Semester along with other courses.

10.3 The list of courses along with MOOC service providers shall be identified by the Chairman, BOS, and Head of the Department. The identified Open Elective (MOOC) courses are to be approved by the Chairman, Academic Council.

10.4 The HOD shall appoint one faculty member as **mentor** (One mentor for each course for with a minimum of 40 students and maximum of 60 students) during the III B.Tech II-Semester for each Open Elective Course registered through MOOC.

10.5 There shall be ONLY semester-end examination for open elective (MOOC) course. It shall be evaluated by the department through ONLINE with 50 multiple choice questions for 100 marks. The department shall prepare the Question Bank for Conducting the ONLINE Open Elective (MOOC) Examination.

11. BREAK OF STUDY FROM A PROGRAM (Gap Year)

11.1 A student is permitted to go on break of study for a maximum period of two years either as two breaks of one year each or a single break of two years.

11.2 In case, a student wishes to extend the gap year for one more consecutive year, he shall be permitted with the prior approval of the Principal on the recommendations of the Head of the Department prior to the beginning of the semester in which he has taken break of study.

11.3 The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The gap year concept is introduced for start-up (or) incubation of an idea, National/International Internships, and professional Volunteering. The application downloaded from the website and duly filled in by the student shall be submitted to the Principal through the Head of the department. A committee shall be appointed by the Principal in this regard. Based on the recommendations of the committee, Principal shall decide whether to permit the student to avail the gap year or not.

11.4 The students permitted to rejoin the program after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining.

The students rejoining in new regulations shall apply to the Principal in the prescribed format through Head of the Department, at the beginning of the readmitted semester for registering additional/equivalent courses to comply with the curriculum in-force.

11.5 The two years period of break of study shall not be counted for the maximum Period of graduation (i.e the maximum period of graduation is 10 years for Regular admitted students and 8 years for Lateral Entry admitted students availing Gap Year).

11.6 If a student has not reported to the college after completion of the approved period of break of study he is deemed to be detained in that semester. Such students are eligible for readmission into the semester when offered next.

12. Examination System:

12.1 All components in any Program of study shall be evaluated through internal evaluation and / or an external evaluation conducted as Semester-end examination.

Sl. No.	Course	Marks	Examination and Evaluation	Scheme of examination
1.	Theory	60	Semester-end examination of 3 hours duration (External evaluation)	The examination question paper in theory courses shall be for a maximum of 60 marks. The question paper shall be of descriptive type with 10 questions each of 12 marks, taken two from each unit. Each unit shall have internal choice and 5 questions shall be answered, one from each unit.

<table>
<tr><th>Sl. No.</th><th>Course</th><th>Marks</th><th colspan="2">Examination and Evaluation</th><th>Scheme of examination</th></tr>
<tr><td></td><td></td><td>40</td><td colspan="2">Mid-term Examination of 2 hours duration
(Internal evaluation).</td><td>Two mid-term examinations each for 40 marks are to be conducted. For a total of 40 marks, 80% of better one of the two and 20% of the other one are added and finalized.
Mid-I: After first spell of instruction (I & II Units).
Mid-II: After second spell of instruction (III, IV & V Units).
The question paper shall be of descriptive type with 5 essay type questions each of 10 marks, out of which 3 are to be answered and evaluated for 30 marks. There shall also be 5 short answer questions each of 2 marks, all are to be answered and evaluated for 10 marks.</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Laboratory</td><td>50</td><td colspan="2">Semester-end Lab Examination for 3 hours duration
(External evaluation)</td><td>The examination shall be conducted by the faculty member handling the laboratory (Examiner-2) and another faculty member (Examiner-1) appointed by the Chief Controller of Examinations.</td></tr>
<tr><td rowspan="2">50</td><td>30</td><td>Day-to-Day evaluation for Performance in laboratory experiments and Record.
(Internal evaluation).</td><td rowspan="2">Two laboratory examinations, which includes Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated by the faculty members handling the laboratory. For a total of 50 marks 80% of better one of the two and 20% of the other one are added and finalized.
Laboratory examination-I: Shall be conducted just before FIRST mid-term examinations.
Laboratory examination-II: Shall be conducted just before SECOND mid-term examinations.</td></tr>
<tr><td>20</td><td>Practical test
(Internal evaluation).</td></tr>
<tr><td>3</td><td>Internship</td><td>100</td><td colspan="2">Semester-end Examination</td><td>The evaluation shall be done by the Department Evaluation Committee (DEC) at the end of the semester as given in 12.2.1.</td></tr>
<tr><td>4</td><td>Open Elective (MOOC)</td><td>100</td><td colspan="2">Semester-end Examination</td><td>The evaluation shall be done by the department through ONLINE with 50 multiple choice questions.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Socially Relevant Project</td><td rowspan="2">100</td><td>50</td><td>Internal Evaluation</td><td>Shall be evaluated as given in 12.2.2(i)</td></tr>
<tr><td>50</td><td>Semester-end evaluation</td><td>Viva-Voce examination shall be conducted at the end of the semester as given in 12.2.2(ii)</td></tr>
</table>

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
6	Mandatory courses	40	Internal Evaluation		Shall be evaluated as given in 12.2.4
7	Audit Courses	-	-		As detailed in 12.2.5
8	Project Work	200	100	Internal evaluation	Continuous evaluation shall be done by the Project Evaluation Committee (**PEC)** as given in 12.2.3.
			100	Semester-end evaluation	Project Work Viva-Voce Examination shall be conducted by a Committee at the end of the semester as given in 12.2.3.

12.2 Internship/Socially Relevant Project/Project Work/Mandatory Course/ Audit Course Evaluation:

12.2.1 Internship:

The student shall undergo **Internship** in an Industry/National Laboratories/Academic Institutions relevant to the respective branch of study. This course is to be registered during III B.Tech II-Semester and taken up during the summer vacation after completion of the III B.Tech II-Semester, for a period of FOUR weeks duration. The Industry Training/Internship shall be submitted in a Report form, and a presentation of the same shall be made before a Department Evaluation Committee (DEC) and it should be evaluated for 100 marks. The DEC shall consist of the Head of the Department, the concerned Supervisor and a Senior Faculty Member of the Department. The DEC is constituted by the Chief Controller of Examinations on the recommendations of the Head of the Department. There shall be no internal marks for Internship. The Internship shall be evaluated at the end of the IV B.Tech I-Semester.

12.2.2 Socially Relevant Project:

A project for community services shall be carried out in teams (maximum 5 students per team) to solve real life problems of society. The Students shall visit the society (Villages/Hospitals/social service organizations etc,.) to identify the problem, conduct literature survey and provide a feasible solution. Each team shall work under the supervision of a guide (faculty member).

(i) Internal Evaluation: Two internal evaluations (First evaluation before the I-Mid-term examinations and second evaluation before the II-Mid-term

examinations) shall be conducted by the guide and a faculty member nominated by the HOD. For a total of 50 marks, 80% of better one of the two and 20% of the other one are added and finalized.

(ii) Semester-end Evaluation: A report on socially relevant project shall be submitted by the team of students to the department at the end of the semester. The Viva-Voce examination shall be conducted by the concerned guide and a senior faculty member recommended by the Head of the Department and appointed by the Chief Controller of Examinations.

12.2.3 Project Work:

(i) Internal Evaluation: The Internal Evaluation shall be made by the Project Evaluation Committee (PEC) consisting of concerned supervisor and two senior faculty members, on the basis of TWO project reviews on the topic of the project. Each review shall be conducted for a maximum of "100" marks. For a total of 100 marks, 80% of better one of the two and 20% of the other one are added and finalized. The PEC is constituted by the Principal on the recommendations of the Head of the Department.

(ii) Semester-end Evaluation: The Semester-end Project Work Viva-Voce Examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of project work shall be done at the end of the IV B.Tech II Semester.

Three copies of the dissertation certified in the prescribed format by the concerned Supervisor and HOD shall be submitted to the Department. One copy is to be submitted to the Chief Controller of Examinations. The examiner shall be nominated by the Chief Controller of the Examinations from the panel of SIX examiners submitted by the Department.

12.2.4 Mandatory Courses:

Mandatory courses carry **"ZERO"** credits. There shall be **NO Semester-end** examination. However, ATTENDANCE in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The internal examination shall be conducted and evaluated similar to the THEORY courses. The student shall be declared to have passed the mandatory courses only when HE secures **40% marks in the internal examination.** If the student FAILS, a re-examination shall be conducted for FAILED candidates in the CONSEQUETIVE

semester. The performance of the student shall be indicated in the grade sheets "**SATISFACTORY" (or) "NOT SATISFACTORY"** as given in 17.1**.** The student should pass all the mandatory courses, for the award of B.Tech degree.

12.2.5 Audit Courses:

Audit courses carry "ZERO" credits. There shall be **NO Internal** and **Semester-end examination**. However, ATTENDANCE in Audit courses shall be considered while calculating aggregate attendance in a semester. The student should study all the audit courses, and it shall be indicated in the GRADE Sheet.

12.3. Eligibility to appear for the Semester-End Examination (SEE):

12.3.1 A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a semester.

12.3.2 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.

12.3.3 Shortage of Attendance below 65% in aggregate **shall in no case be condoned.**

12.3.4 Students whose shortage of attendance is not condoned in any semester are not eligible to take their semester-end examinations of that class and their registration shall stand cancelled.

12.3.5 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable. The student may seek readmission for the semester when offered next. He shall not be allowed to register for the courses of the semester while he is in detention. A student detained due to shortage of attendance, shall have to repeat that semester when offered next.

12.3.6 A stipulated fee shall be payable to the College towards Condonation of shortage of attendance.

12.3.7 The attendance in ***Student Development Activities*** shall be considered for finalization of aggregate attendance.

12.3.8 For the calculation of a student attendance in any semester, the total number of classes conducted shall be counted as scheduled in the class-work time table.

12.4. Evaluation:

Following procedure governs the evaluation.

12.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the Semester-end examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at the total marks for any course in that semester.

12.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Results Committee and moderation is applied if needed and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

12.4.3. Student-wise tabulation shall be done and individual grade Sheet shall be generated and issued to the student.

12.5. Personal verification / Revaluation / Recounting:

Students shall be permitted for personal verification/request for recounting/ revaluation of the Semester-end examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

12.6. Supplementary Examination:

In addition to the regular semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

13. Academic Requirements for promotion/ completion of regular B.Tech Program of study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/completion of regular B.Tech Program of study.

For students admitted into B.Tech. (Regular) Program:

13.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory course, laboratory course, socially relevant project and project work, if he secures not less than 40% of marks in the Semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and Semester-end examination taken together. For the courses **"Internship"** and **"Open Elective (MOOC)",** he should secure not less than 40% of marks in the semester-end examination.

13.2 A student shall be promoted from second year to third year of Program of study only if he fulfills the academic requirement of securing 40% of credits (rounded off to lower integer number) from the following examinations (Irrespective of whether or not the candidate appears for the semester-end examinations as per the normal course of study):

a. **One** regular and **two** supplementary examinations of I B.Tech I Semester.

b. **One** regular and **one** supplementary examinations of I B.Tech II Semester.

c. **One** regular examination of II B.Tech I Semester.

13.3 A student shall be promoted from third year to fourth year of Program of study only if he fulfills the academic requirements of securing 40% of credits (rounded off to lower integer number) from the following examinations (Irrespective of whether or not the candidate appears for the semester-end examinations as per the normal course of study):

a. **One** regular and **four** supplementary examinations of I B.Tech I Semester.

b. **One** regular and **three** supplementary examinations of I B.Tech II Semester.

c. **One** regular and **two** supplementary examinations of II B.Tech I Semester.

d. **One** regular and **one** supplementary examinations of II B.Tech II Semester.

e. **One** regular examination of III B.Tech I Semester.

* In case of getting detained for want of credits by sections 13.2 and 13.3 above, the student may make up the credits through supplementary examinations.

13.4 A student shall register for all the 160 credits and earn all the 160 credits. Marks obtained in all the 160 credits shall be considered for the calculation of the DIVISION based on CGPA.

13.5 A student who fails to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit his seat in B.Tech. Program and his admission stands cancelled.

For Lateral Entry Students (batches admitted from the academic year 2020-2021):

13.6 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical course, Socially relevant project and Project Work, if he secures not less than 40% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the courses "Internship" and "Open Elective (MOOC)", he shall be declared to have passed if he secures minimum of 40% of marks in the semester-end examination.

13.7 A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 40% of credits (rounded off to lower integer number) from the following examinations:

a. **One** regular and **Two** supplementary examinations of II B.Tech I Semester.

b. **One** regular and **One** supplementary examinations of II B.Tech II Semester.

c. **One** regular examination of III B.Tech I Semester.

Irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits the student may make up the credits through supplementary examinations.

13.8 A student shall register for all 118 credits and earn all the 118 credits. Marks obtained in all the 118 credits shall be considered for the calculation of the DIVISION based on CGPA.

13.9 A student who fails to earn 118 credits as indicated in the course structure within six academic years from the year of their admission shall forfeit his seat in B.Tech Program and his admission stands cancelled.

14. Minor degree in a discipline:

The concept of Minor degree is introduced in the curriculum of all B. Tech. programs offering a Major degree. The main objective of Minor degree in a discipline is to provide additional learning opportunities for academically

motivated students and it is an optional feature of the B.Tech Program. In order to earn a Minor degree in a discipline, a student has to earn 20 extra credits (By studying SIX theory and TWO laboratory courses) from the core courses of the minor discipline.

a. Students having a CGPA of 8.0 or above up to II B.Tech I-Semester without any backlogs shall be permitted to register for Minor degree.

b. An SGPA and CGPA of 7.5 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration live or else it shall be cancelled.

c. Students aspiring for a Minor degree must register from III B.Tech I-Semester onwards and must opt for a **Minor in a discipline other than the discipline** he is registered in.

d. A Student shall register for a maximum of **SEVEN** credits in a semester starting from III B.Tech I-Semester to IV B.Tech I-Semester (Either **TWO** theory and **ONE** laboratory course (or) **TWO** theory courses).

e. The Evaluation pattern of the courses shall be similar to the regular program courses evaluation.

f. Minimum strength required for offering a **Minor in a** discipline is considered as 20% of the class size and Maximum should be 80% of the class size.

g. Minor degree program should be completed by the end of IV B. Tech II-Semester along with the Major discipline.

h. **A student registered for Minor degree shall pass in all subjects that constitute the requirement for the Minor** degree program**.** No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for **Minor** degree program.

i. The **Minor degree** shall 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**. This shall also be reflected in the transcripts, along with the list of courses taken for **Minor degree** program with CGPA mentioned separately.

j. Separate course/class work and time table shall be arranged for the various Minor degree programs. Attendance regulations for these Minor discipline programs shall be as per regular courses.

NOTE: Interested meritorious students shall be permitted to register either for Minor degree in a discipline (or) Honours Degree in a discipline only, **but not both.**

15. Honours degree in a discipline:

a. Students having a CGPA of 8.0 and above up to II B.Tech I-Semester without any backlogs shall be permitted to register for Degree with Honours.

b. The concept of **Honours degree** is introduced in the curriculum for all B. Tech. programs. The main objective of Honours degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. program. In order to earn Honours degree in a discipline, a student has to earn 20 extra credits by studying FIVE advanced courses for 15 credits (by choosing not more than TWO courses in a semester staring from III B.Tech. I Semester) and by carrying out a **mini project** for 5 credits in the concerned branch of Engineering. The Evaluation pattern of theory courses shall be similar to the regular program courses evaluation. Students aspiring for Honours degree must register from III B.Tech I-Semester semester onwards. Students may register for mini project from III B.Tech II-Semester onwards and complete the same by the end of IV B. Tech I-Semester.

c. **Procedure for Conduct and Evaluation of Honours degree Mini project:**

Out of a total of 100 marks for the **Mini project**, 50 marks shall be for Internal Evaluation and 50 marks for the Semester-end Examination (Viva-voce). The Internal Evaluation shall be made by the Project Evaluation Committee **(PEC)** consisting of concerned supervisor and two senior faculty members, on the basis of TWO project reviews on the topic of the mini project. Each review shall be conducted for a maximum of "50" marks. The final internal marks shall be taken as the SUM of marks obtained in the two reviews. The **PEC** is constituted by the Principal on the recommendations of the Head of the Department. The Semester-end examination (Viva-Voce) shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of mini project work shall be done at the end of the IV B.Tech I- Semester.

NOTE: Interested meritorious students shall be permitted to register either for Minor degree in a discipline (or) Honours Degree in a discipline only, **but not both.**

16. Transitory Regulations:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the Program

in earlier regulations (or) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent courses as and when courses are offered and they shall be in the academic regulations into which they are presently readmitted.

A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of eight years and a lateral entry student within six years for the award of B.Tech Degree.

17. Grades, Semester Grade Point Average and Cumulative Grade Point Average:

17.1. Grade System: After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "10 point scale" as described below.

Grades Conversion and Grade points Attached

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
> = 95	O	Outstanding	10
> = 85 to < 95	S	Superior	9
> = 75 to < 85	A	Excellent	8
> = 65 to < 75	B	Very Good	7
> = 55 to < 65	C	Good	6
> = 45 to < 55	D	Fair	5
> = 40 to < 45	E	Pass	4
< 40	F	Fail	0
Not Appeared	N	Absent	0
For Mandatory Courses			
>=40	P	Satisfactory	-
<40	I	Not Satisfactory	-

Pass Marks:

A student shall be declared to have passed theory course, laboratory course, Socially relevant project and project work if he secures minimum of 40% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. For Industrial training/internship he shall be declared to have passed if he secures minimum of

40% of marks in the semester-end examination. Otherwise, he shall be awarded fail grade - '**F'** in such a course irrespective of internal marks. '**F'** is considered as a fail grade indicating that the student has to pass the Semester-End Examination in that course in future and obtain a grade other than '**F'** and '**N'** for passing the course.

For the Mandatory Courses, if the student obtained 40% or more marks, then his performance shall be indicated as "P" (SATISFACTORY), otherwise the performance shall be indicated as "I" (NOT SATISFACTORY) in the grade sheet.

17.2. Semester Grade Point Average (SGPA): SGPA shall be calculated as given below on a "10 point scale" as an index of the student's performance:

$$SGPA = \frac{\sum (C\ X\ GP)}{\sum C}$$

Where "C" denotes the "credits" assigned to the courses undertaken in that semester and "GP" denotes the "grade points" earned by the student in the respective courses.

Note: SGPA is calculated only for the candidates who appeared in the semester-end regular examinations in a particular semester:

17.3. Cumulative Grade Point Average (CGPA):

The CGPA shall be calculated for a candidate appeared in the Semester-end examinations for all the courses (including Regular & Supplementary) till that semester. The CGPA shall be displayed in the Grade sheet of the Regular Semester-end examinations and also in the consolidated Grade Sheet issued at the end of the program. The CGPA is computed on a 10 point scale as given below:

$$CGPA = \frac{\sum (C\ X\ GP)}{\sum C}$$

where C denotes the credits assigned to courses undertaken up to the end of the Program and GP denotes the grade points earned by the student in the respective courses.

18. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student on his performance in all the courses registered in that semester indicating the **SGPA and CGPA.**

19. Consolidated Grade Sheet: After successful completion of the entire Program of study, a Consolidated Grade Sheet indicating performance of all academic years shall be issued as a final record. Duplicate Consolidated Grade Sheet shall also be issued, if required, after payment of requisite fee.

20. Award of Degree: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council, SVEC (Autonomous).

20.1. Eligibility: A student shall be eligible for the award of B.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed).
- Has NO DUES to the College, Hostel, Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

20.2. Award of Division: Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class
> = 4.0 and < 5.0	Pass Class

21. Additional Academic Regulations:

21.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

21.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the ANNEXURE-I.

21.3 When a student is absent for any examination (Mid-term or Semester-end) he shall be awarded zero marks in that component (course) and grading shall be done accordingly.

21.4 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

22. Withholding of Results:

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he shall not be allowed/promoted to the next higher semester.

23. Amendments to Regulations:

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

24. General:

The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.

Note: Failure to read and understand the regulations is not an excuse.

ANNEXURE-I

GUIDELINES FOR DISCIPLINARY ACTION FOR MALPRACTICES/ IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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 candidate 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.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he shall be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for four consecutive semesters from class work and all Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he shall be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
		examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/ Invigilator/ 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 Controller of Examinations 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 Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester. If the candidate physically assaults the invigilator/Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they shall be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess 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 the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SVEC-19 CURRICULUM

Course Structure for B.Tech Program
(Effective from the Academic year 2019-20 onwards)

CIVIL ENGINEERING

Mandatory Induction Program	**03 weeks duration**
Induction program offered before commencement of the I-Semester course work	Physical activity
	Creative Arts
	Universal Human Values
	Literary
	Proficiency Modules
	Lectures by Eminent People
	Visits to local Areas
	Familiarization to Department/Branch and Innovations

COURSE STRUCTURE

CIVIL ENGINEERING

I B.Tech. – I Semester

S.No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT1BS01	Differential Equations and Multivariable Calculus	3	1	-	4	4	40	60	100
2.	19BT1BS04	Engineering Chemistry	3	-	-	3	3	40	60	100
3.	19BT1HS01	Communicative English	3	-	-	3	3	40	60	100
4.	19BT10501	Programming for Problem Solving	3	1	-	4	4	40	60	100
5.	19BT1BS32	Engineering Chemistry Lab	-	-	2	2	1	50	50	100
6.	19BT1HS31	Communicative English Lab	-	-	2	2	1	50	50	100
7.	19BT10331	Computer Aided Engineering Drawing	-	1	2	3	2	50	50	100
8.	19BT10531	Programming for Problem Solving Lab	-	-	2	2	1	50	50	100
		Total:	**12**	**3**	**8**	**23**	**19**	**360**	**440**	**800**

I B.Tech. – II Semester

S. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT2BS01	Transformation Techniques and Linear Algebra	3	1	-	4	4	40	60	100
2.	19BT1BS02	Biology for Engineers	2	-	-	2	2	40	60	100
3.	19BT2BS02	Applied Physics	3	-	-	3	3	40	60	100
4.	19BT10201	Basic Electrical and Electronics Engineering	3	-	-	3	3	40	60	100
5.	19BT20101	Civil Engineering Materials and Concrete Technology	3	-	-	3	3	40	60	100
6.	19BT20102	Engineering Mechanics	3	1	-	4	4	40	60	100
7.	19BT2BS31	Applied Physics Lab	-	-	2	2	1	50	50	100
8.	19BT10231	Basic Electrical and Electronics Engineering Lab	-	-	2	2	1	50	50	100
9.	19BT20331	Engineering Workshop	-	-	2	2	1	50	50	100
10.	19BT20131	Engineering Geology Lab	-	-	2	2	1	50	50	100
		Total:	**17**	**2**	**8**	**27**	**23**	**440**	**560**	**1000**
11.	19BT1AC01	Spoken English	2	-	-	2	-	-	-	-

II B.Tech. – I Semester

S.No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT3BS01	Numerical Methods, Probability and Statistics	3	1	-	4	4	40	60	100
2.	19BT31501	Design Thinking	2	-	-	2	2	40	60	100
3.	19BT30101	Construction, Planning and Project Management	3	-	-	3	3	40	60	100
4.	19BT30102	Fluid Mechanics	3	-	-	3	3	40	60	100
5.	19BT30103	Mechanics of Solids	3	1	-	4	4	40	60	100
6.	19BT30104	Surveying	3	-	-	3	3	40	60	100
7.	19BT31531	Design Thinking Lab	-	-	2	2	1	50	50	100
8.	19BT30131	Civil Engineering Materials and Construction Technology Workshop	-	-	2	2	1	50	50	100
9.	19BT30132	Strength of Materials Lab	-	-	2	2	1	50	50	100
10.	19BT30133	Surveying Lab	-	-	2	2	1	50	50	100
Total:			**17**	**2**	**8**	**27**	**23**	**440**	**560**	**1000**
11.	19BT3MC01	Constitution of India	3	-	-	3	-	40	-	40

II B.Tech. – II Semester

S. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT40101	Environmental Engineering	3	-	-	3	3	40	60	100
2.	19BT40102	Hydraulic Engineering	3	-	-	3	3	40	60	100
3.	19BT40103	Soil Mechanics	3	-	-	3	3	40	60	100
4.	19BT40104	Structural Analysis	3	1	-	4	4	40	60	100
5.	**Open Elective-2**		3	-	-	3	3	40	60	100
6.	19BT3HS31	Soft Skills Lab	-	-	2	2	1	50	50	100
7.	19BT41231	AI Tools Lab	-	1	2	3	2	50	50	100
8.	19BT40131	Environmental Engineering Lab	-	-	2	2	1	50	50	100
9.	19BT40132	Fluid Mechanics and Hydraulic Machinery Lab	-	-	2	2	1	50	50	100
10.	19BT40133	Geotechnical Engineering Lab	-	-	2	2	1	50	50	100
		Total:	**15**	**2**	**10**	**27**	**22**	**450**	**550**	**1000**
11.	19BT3MC02	Environmental Science	3	-	-	3	-	40	-	40

III B.Tech. – I Semester

S.No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT50101	Foundation Engineering	3	-	-	3	3	40	60	100
2.	19BT50102	Hydrology and Water Resources Engineering	3	-	-	3	3	40	60	100
3.	19BT50103	Reinforced Cement Concrete Structures	3	-	-	3	3	40	60	100
4.	19BT50104	Transportation Engineering	3	-	-	3	3	40	60	100
5.	**Open Elective-1**		3	-	-	3	3	40	60	100
6.	**Open-Elective-3 (Interdisciplinary Elective- 1)**		3	-	-	3	3	40	60	100
	19BT70310	Computational Fluid Dynamics								
	19BT50341	Thermodynamics and Heat Transfer								
	19BT50441	Principles of Image Processing								
	19BT50108	Energy Science and Engineering								
	19BT50109	Pipeline Engineering								
7.	19BT50131	Computer Aided Building Planning and Drawing	-	-	2	2	1	50	50	100
8.	19BT50132	Transportation Engineering Lab	-	-	2	2	1	50	50	100
9.	19BT50133	Survey Camp	-	-	-	-	1	50	50	100
Total:			**18**	**-**	**4**	**22**	**21**	**390**	**510**	**900**
10.	19BT5AC01	MATLAB Practice for Civil Engineers	-	-	2	2	-	-	-	-

III B.Tech. – II Semester

S. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT6HS02	Organizational Behavior	3	-	-	3	3	40	60	100
2.	19BT60101	Steel Structures	2	-	-	2	2	40	60	100
3.	**Professional Elective–1**		3	-	-	3	3	40	60	100
	19BT60102	Advanced Structural Analysis								
	19BT60103	Advanced Surveying								
	19BT60104	Air and Noise Pollution and Control								
	19BT60105	Architecture and Town Planning								
	19BT60106	Ground Improvement Techniques								
	19BT60107	Irrigation Engineering								
	19BT60108	Railway Engineering								
4.	**Professional Elective–2**		3	-	-	3	3	40	60	100
	19BT60109	Advanced Reinforced Cement Concrete Structures								
	19BT60110	Geoenvironmental Engineering								
	19BT60111	Global Positioning System (GPS)								
	19BT60112	Groundwater Development and Management								
	19BT60113	Rehabilitation and Retrofitting of Structures								
	19BT60114	Solid and Hazardous Waste Management								
	19BT60115	Transportation Planning and Management								
5.	**Professional Elective–3**		3	-	-	3	3	40	60	100
	19BT60116	Earthquake Resistant Design of Structures								
	19BT60117	Highway Construction and Maintenance								
	19BT60118	Industrial Wastewater Treatment								
	19BT60119	Infrastructure Development and Management								
	19BT60120	Land Survey and Real Estate Development								

S. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
	19BT60121	Soil Dynamics and Machine Foundations								
	19BT60122	Sustainable Water Resources Development								
6.	**Open-Elective-4 (Interdisciplinary Elective-2)**		3	-	-	3	3	40	60	100
	19BT50204	Energy Audit, Conservation and Management								
	19BT50341	Optimization Techniques								
	19BT60123	Construction Equipment and Automation								
	19BT60124	Fire Engineering								
	19BT60125	Smart Materials and Structures								
7.	19BT61532	Internet of Things (IoT) Lab	-	1	2	3	2	50	50	100
8.	19BT60131	Civil Engineering Software Lab	-	-	2	2	1	50	50	100
9.	19BT60132	Socially Relevant Project	-	-	-	-	1	50	50	100
Total:			**17**	**1**	**4**	**22**	**21**	**390**	**510**	**900**
10.	19BT5MC01	Indian Tradition and Culture	3	-	-	3	-	40	-	40

IV B.Tech. – I Semester

S. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT6HS01	Principles of Business Economics and Accountancy	3	-	-	3	3	40	60	100
2.	19BT70101	Estimation and Quantity Surveying	3	-	-	3	3	40	60	100
3.	19BT70102	Geospatial Technologies	2	-	-	2	2	40	60	100
4.	**Professional Elective–4**		3	-	-	3	3	40	60	100
	19BT70103	Advanced Foundation Engineering								
	19BT70104	Environmental Hydraulics								
	19BT70105	Pavement Analysis and Design								
	19BT70106	Prestressed Concrete								
	19BT70107	River Engineering and River Basin Management								
	19BT70108	Structural Health Monitoring								
	19BT70109	Sustainable Construction								
5.	**Professional Elective–5**		3	-	-	3	3	40	60	100
	19BT70110	Analysis and Design of Composite Structures								
	19BT70111	Civil Infrastructure for Smart City Development								
	19BT70112	Environmental Impact Assessment and Management								
	19BT70113	Finite Element Methods in Civil Engineering								
	19BT70114	Geotechnics for Underground Structures								
	19BT70115	Traffic Engineering and Management								
	19BT70116	Water Resources Systems Planning and Management								
6.	19BT7MOOC	Open Elective–5 (MOOC)	-	-	-	-	3	-	100	100
7.	19BT70131	Remote Sensing and Geographical Information Systems Lab	-	-	2	2	1	50	50	100
8.	19BT70132	Computer Aided Design and Detailing Lab	-	-	2	2	1	50	50	100
9.	19BT70133	Internship	-	-	-	-	2	--	100	100
		Total:	**14**	**-**	**4**	**18**	**21**	**300**	**600**	**900**
10.	19BT7AC01	Spread Sheet Applications in Civil Engineering	-	-	2	2	-	-	-	-

IV B.Tech. – II Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT80131	Project Work	-	-	-	-	10	100	100	200
Total:			**-**	**-**	**-**	**-**	**10**	**100**	**100**	**200**

LIST OF COURSES FOR OPEN ELECTIVE–1 & OPEN ELECTIVE-2

Course Code	Open Elective -1	Course Code	Open Elective -2
19BT4BS01	Material Science	19BT4HS01	Banking and Insurance
19BT4HS02	Business Communication and Career Skills	19BT4HS03	Cost Accountancy and Financial Management
19BT4HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19BT4HS05	Gender and Environment
19BT4HS06	German Language	19BT4HS07	Indian Economy
19BT4HS08	Indian History	19BT4HS09	Life Skills
19BT4HS10	Personality Development	19BT4HS11	Professional Ethics
19BT4HS12	Women Empowerment	19BT40105	Disaster Mitigation and Management
19BT50105	Environmental Pollution and Control	19BT40106	Sustainable Engineering
19BT50106	Planning for Sustainable Development	19BT40107	Contract Laws and Regulations
19BT50107	Rural Technology	19BT50208	Intellectual Property Rights
19BT40205	Energy Management and Conservation	19BT40305	Global Strategy and Technology
19BT50504	Ethical Hacking	19BT40306	Management Science
19BT51207	ICT in Healthcare	19BT50408	Green Technologies
19BT51505	Bioinformatics	19BT40505	Cyber Laws and Security

MINOR DEGREE IN CIVIL ENGINEERING

Courses for Minor Degree in Civil Engineering

Semester	Course Code	Course Title	Contact Periods per week				C
			L	T	P	Total	
III B.Tech I-Sem	19BT20101	Civil Engineering Materials and Concrete Technology	3	-	-	3	3
	19BT30101	Construction, Planning and Project Management	3	-	-	3	3
III B.Tech II-Sem	19BT30104	Surveying	3	-	-	3	3
	19BT40103	Soil Mechanics	3	-	-	3	3
	19BT30133	Surveying Lab	-	-	2	2	1
IV B.Tech I-Sem	19BT40101	Environmental Engineering	3	-	-	3	3
	19BT50104	Transportation Engineering	3	-	-	3	3
	19BT40131	Environmental Engineering Lab	-	-	2	2	1
TOTAL							**20**

COURSES FOR HONORS DEGREE

Advanced Courses for B.Tech Degree with Honours in Civil Engineering:

Semester	Course Code	Courses	L	C
III B.Tech I-Sem	19BT50110	Environmental Economics	3	3
	19BT50111	Rock Mechanics	3	3
	19BT50112	Watershed Management	3	3
III B.Tech II-Sem	19BT60126	Geosynthetics and Reinforced Soil Structures	3	3
	19BT60127	Intelligent Transportation Systems	3	3
	19BT60128	Offshore Engineering	3	3
IV B.Tech I-Sem	19BT70117	Bridge Engineering	3	3
	19BT70118	Prefabricated Structures	3	3
	19BT70119	Urban Stormwater Management	3	3
	19BT70134	Mini Project	-	5

I B. Tech. - I Semester

(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**

(Common to EEE, ECE, EIE, CE, ME, CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration);Multivariable Calculus (Vector Calculus).

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.

CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.

CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

DETAILED SYLLABUS:

Unit I: Ordinary Differential Equations (9 Periods)

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous equations with R.H.S terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)\ and\ xV(x)$; method of variation of parameters; Equations reducible to linear differential equations with constant coefficients: Cauchy's and Legendre's linear equations; Applications to L-C-R Circuit problems.

Unit II: Partial Differential Equations (9 Periods)

Formation of PDE, solutions of first order linear and non-linear PDEs, solution to homogenous and non-homogenous linear partial differential equations of second and higher order by complimentary function and particular integral method, method of separation of variables in Cartesian coordinates.

Unit III: Multivariable Calculus (Differentiation) (9 Periods)

Partial derivatives, Chain rule, Total derivative, Jacobian, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit IV: Multivariable Calculus (Integration) (9 Periods)

Evaluation of Double integrals (Cartesian and polar coordinates), Change of order of integration (Cartesian form only); Evaluation of Triple integrals; Change of variables: double integration from Cartesian to polar coordinates, Triple integration from Cartesian to spherical and cylindrical polar coordinates; Areas enclosed by plane curves.

Unit V: Multivariable Calculus (Vector Calculus) (9 Periods)

Vector Differentiation: Scalar and Vector fields: Gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, Laplacian operator. **Vector Integration:** Line integral-circulation-work done, Surface integral-flux and Volume integral; Vector integral theorems: Theorems of Green, Gauss and Stokes (without proofs).

Total Periods: 45

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Engineering Mathematics, vol-1*, S. Chand and Company, 13th edition, 2014.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

REFERENCE BOOKS:

1. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett, 6th edition, 2011.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 6th edition, 2017.

I B. Tech. - I Semester

(19BT1BS04) **ENGINEERING CHEMISTRY**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.

CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

DETAILED SYLLABUS:

Unit I: Atomic Structure and Bonding Theories (9 Periods)

Quantum-mechanical model of atom, Schrodinger wave equation, significance of Ψ and Ψ^2, applications to particle in a box and hydrogen atom; Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of N_2, O_2, NO and CO; Π-molecular orbitals of butadiene and benzene; VSEPR theory and molecular shapes.

Unit II: Water Treatment **(9 Periods)**

Introduction, types of water, Impurities in water and their consequences. Hardness of water, units of hardness, disadvantages of hardness, measurement of hardness by EDTA method, numerical problems on measurement of hardness of water, boiler troubles-priming & foaming, scales & sludge, caustic embrittlement, boiler corrosion, softening of water– Ion exchange process, zeolite process, desalination of brackish water by reverse osmosis, Drinking water treatment- Ozonisation & chlorination, specifications of potable water as per WHO and BIS standards. Fluoride in ground water: Effects on human health, defluoridation method – Nalgonda method; merits and demerits of various defluoridation methods.

Unit III: Electrochemistry and Applications **(10 Periods)**

Electrode potential, Nernst equation, reference electrodes (Calomel electrode and glass electrode), electrochemical cell, cell potential calculations. Primary cells – dry cell, alkali metal sulphide batteries, Secondary cells – lead acid, lithium ion batteries, Fuel cells - Hydrogen-oxygen fuel cell, Methanol-oxygen fuel cell, Solid-oxide fuel cell.

Corrosion: Introduction, Definition, types of corrosion- wet (galvanic corrosion, concentration cell corrosion) and dry corrosion, Factors influencing corrosion, control of corrosion- sacrificial anodic protection, Impressed current cathodic protection, electroplating method (Nickel).

Unit IV: Instrumental Methods and Applications **(9 Periods)**

Introduction to spectroscopy–types of energy present in molecules, types of spectra, UV-Vis spectroscopy – principle, types of electronic transitions, chromophore, auxochrome, Bathochromic shift, Hypsochromic shift, Instrumentation of UV-Vis spectrophotometer, applications; Infrared spectroscopy – principle, types of vibrational modes, group frequencies, Instrumentation of IR spectrophotometer, applications. principle and applications of physicochemical methods (SEM, TEM, X-ray diffraction).

Unit V: Fuel chemistry and Lubricants **(8 Periods)**

Fuel chemistry: Types of fuels, calorific value, numerical problems based on calorific value; Liquid fuels, cracking of oils (Thermal and Fixed-bed catalytic cracking), knocking and anti-knock agents, Octane and Cetane values, Synthetic petrol: Fischer-Tropsch method and Bergius process.

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity and viscosity index , flash and fire points, cloud and pour points, Aniline points, neutralization number and mechanical strength.

Total Periods: 45

TEXT BOOKS:

1. P. C. Jain & Monika Jain*, Engineering Chemistry*, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.

2. K. N. Jayaveera, G. V. Subba Reddy and C. Ramachandriah, *Engineering Chemistry,* Mc.Graw Hill Publishers, New Delhi.

REFERENCE BOOKS:

1. J. D. Lee, *Concise Inorganic Chemistry*, Oxford University Press, 5th edition 2010.
2. Skoog and West, *Principles of Instrumental Analysis*, Thomson, 6th edition, 2007.
3. Peter Atkins, Julio de Paula and James Keelar, *Atkins' Physical Chemistry*, Oxford University Press, 10th edition, 2010.

I B. Tech – I Semester

(19BT1HS01) **COMMUNICATIVE ENGLISH**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION (9 Periods)

Introduction – Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication– Barriers to Communication (classification) - Case study

UNIT II - ACTIVE LISTENING (9 Periods)

Introduction –Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information - Case study

UNIT III - EFFECTIVE SPEAKING (9 Periods)

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Conferences; significance, planning and preparation and procedure – Symposia and Seminars - Persuasive Speaking - Case study

UNIT IV - READING (9 Periods)

Introduction – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading ––Techniques for Good Comprehension- SQ3R Reading Technique –Study Skills - Case study

UNIT V – TECHNICAL WRITING **(9 Periods)**

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Paragraphs Construction – Essays: types, Steps to Essay Writing and Checklist – Précis Writing - Case study

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha, Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.
2. Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
2. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

ADDITIONAL LEARNING RESOURCES

1. https://www.skillsyouneed.com/ips/active-listening.html: A useful summary of what active listening skills are.
2. https://en.wikipedia.org/wiki/Active_listening: Wikipedia entry about active listening.
3. https://www.forbes.com/sites/womensmedia/2012/11/09/10-steps-to-effective-listening/#4b27a2503891: Ten steps to Active Listening (by Forbes magazine).
4. https://goo.gl/t1Uqrt: 20 tips for organizing a conference.
5. https://goo.gl/kPMr9u: 10 important issues for speakers at a conference.
6. https://goo/gl/C5bDvv: Wikihow guide to organizing a conference.

I B. Tech. – I Semester

(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics

COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Python constructs to solve basic problems.

CO2. Develop and use Python modules to provide solutions to problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

(10 periods)

Problem Solving Aspect: top-down design, implementation of algorithms, building blocks of flow charts, program verification and efficiency of algorithms.

Python Programming: tokens, literals, identifiers, keywords, special symbols and operators; fundamental data types, expressions, type conversions, handling Input and output in Python.

UNIT-II: CONTROL STRUCTURES **(8 periods)**

Selection Statements: if statement, if-else statement, if-elif-else statement, nested-if statement.

Iterative Statements: while loop, for loop, break statement, continue statement, pass and else statements used with loops.

UNIT-III: SEQUENCES, SETS, DICTIONARIES AND DATA STRUCTURES

(9 periods)

Sequences: Lists and operations - creating, inserting elements, updating elements, deleting elements, searching and sorting, list comprehensions, nested lists; **tuples -** creating, searching and sorting, nested tuples; **strings -** Initializing a string and string operations, string handling methods, string formatting; **sets -** set creation and operations; **dictionaries -** operations on dictionaries, dictionary methods, sorting elements using lambdas.

Data structures: Stacks - push, pop, peek and display operations on stack, applications of stack; **Queues –** enqueue, dequeue and display operations on queue, applications of queues.

UNIT-IV: MODULAR PROGRAMMING AND FILE HANDLING (10 periods)

Modular Programming: need for functions, function definition, function call, variable scope and lifetime, return statement, positional arguments, keyword arguments, default arguments and variable-length arguments, recursive functions; Modules - math, NumPy, date and time.

File Handling: types of files, opening and closing files, reading and writing data.

UNIT-V: DATA REPRESENTATION AND VISUALIZATION (8 periods)

Pandas: creating data frame, reading data from CSV files, indexing and selecting data, dealing with rows and columns; Visualization - bar plots, histogram, Scatter Plot.

Total Periods: 45

TEXT BOOKS:

1. R. Nageswara Rao, *Core Python Programming,* 2nd edition, Dreamtech Press, 2018.
2. R. G. Dromey, *How to solve it by Computer,* Pearson, 2006.

REFERENCE BOOKS:

1. Reema Thareja, *Python Programming using Problem Solving Approach*, 1st edition, Oxford University Press, 2017.
2. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India, 2016.

I B. Tech. - I Semester

(19BT1BS32) **ENGINEERING CHEMISTRY LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3. Work independently and in teams to solve problems with effective communication.

A minimum of any **Ten** exercises are to be conducted among the following:

List of Practical Exercises:

1. Estimation of Hardness of water by EDTA method
2. Determination of alkalinity of Water sample
3. Estimation of Dissolved Oxygen in water by Winkler's method.
4. Estimation Fe (II) by Dichrometry
5. Conductometric titration of strong acid Vs strong base
6. Estimation of Ferrous ion by Potentiometry
7. Determination of strength of acid by P^H metric method

8. Determination of Strength of an acid in Pb-Acid battery
9. Determination of Viscosity by Ostwald's viscometer
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of residual chlorine in drinking water.
12. Identification of simple organic compounds by UV-Vis and IR spectroscopy

TEXT BOOKS:

1. K. Mukkanti, *Practical Engineering Chemistry*, BS Publications, 2013.
2. K. N. Jayaveera, K. B. Chandra Sekhar, *Chemistry laboratory manual*, S. M. Enterprises Limited, 2013.

I B. Tech. - I Semester

(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Function effectively as an individual and as a member in diverse teams analyzing the situations and applying appropriate listening, speaking, reading, writing skills to communicate effectively with the engineering community and society.

***First ten exercises are mandatory among the following:**

List of Exercises:

1. Just a Minute, Elocution/Impromptu

Steps to be followed – Useful tips – Dos & Don'ts – Preparation – Examples

2. Phonetics

Sounds of English – Consonants – Vowels – Speech Organs – Phonetic Transcription – Word Accent – Basics of Intonation

3. Vocabulary Building

Prefixes & Suffixes – Synonyms & Antonyms – Phrasal verbs – Idioms – One word substitutes – Words often confused

4. Grammar

Tenses –Nouns – Word order and error correction

5. Giving Directions

Useful phrases – Sample conversations - Exercises

6. Role Plays

Useful tips – Dos & Don'ts – Exercises – Role Plays for practice

7. Public Speaking

Stage presence – Voice control – Body Language – Rehearsals – Audience – Delivery - Dos & Don'ts – Project Submission

8. Letter Writing

Introduction – Objective – Formats – Types – Exercises

9. Describing Objects

Jargon – Useful Phrases – Do's & Don'ts – Exercises

10. Listening Comprehension

Introduction – Types of listening – Practice – Benefits of listening – Exercises

11. Information Transfer

Tables – Pie Charts – Venn Diagrams – Graphs – Flow Charts – Steps to be followed – Exercises

12. Reading Comprehension

Introduction – Types of reading – Inferring – Critical analysis – Exercises

TEXT BOOK:

1. Communicative English Lab Manual (SVEC-19)

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson, Noida, 2010.

2. Nira Kumar, English *Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

1. SoftX
2. Speech Solutions

3. English Pronunciation Dictionary by Daniel Jones

4. Learning to Speak English 8.1, The Learning Company – 4 CDs.

5. Mastering English: Grammar, Punctuation and Composition.

6. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

7. Dorling Kindersley Series of Grammar.

8. Language in Use 1, 2 & 3

9. Cambridge Advanced Learner's Dictionary - 3rd Edition

10. Centronix – Phonetics

11. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES

1. https://goo.gl/IjE45p: Amazon India site – with thousands of different product descriptions
2. https://goo.gl/3ozeO6: 15 ways to calm your nerves before giving a presentation.
3. https://goo.gl/p20ttk: useful site for more language about introducing yourself.

I B. Tech. – I Semester

(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES:--

COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.

CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.

DETAILED SYLLABUS:

Introduction to Engineering Graphics and Design:

Principles, significance -Conventions in drawing-lettering - BIS conventions-Dimensioning principles and conventional representations.

Exercises:

1. Practice exercise on Basic Lettering and Dimensioning
2. Practice exercise on Conventional representations

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Exercises:

3. Practice exercise using basic drawing commands
4. Practice exercise using editing commands

CONICS, CURVES, PROJECTION OF POINTS, LINES AND PLANES

Conics & Special Curves: Conic sections including the rectangular hyperbola-eccentricity method only; Cycloid, Epicycloid and Hypocycloid, Involutes.

Exercises:

5. Practice exercises on Ellipse, Parabola, Hyperbola and Rectangular Hyperbola
6. Practice exercises on Cycloid, Epicycloid, Hypocycloid and Involutes

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line , Projections of regular plane surfaces.

Exercises:

7. Practice exercises on Projection of points
8. Practice exercises on projection of lines inclined to one plane
9. Practice exercises on projection of lines inclined to both planes
10. Practice exercises on Projections of regular plane surfaces

PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projection of solids: Projection of regular solids inclined to one plane.

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone, True shapes of the sections.

Exercises:

11. Practice exercises on Projections of regular solids
12. Practice exercises on Sections of solids

DEVELOPMENT OF SURFACES

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Exercises:

13. Practice exercises on Development of surfaces of right regular solids

ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Exercises:

14. Practice exercises on Orthographic Projections
15. Practice exercises on Isometric Projections

TEXT BOOKS:

1. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, *Engineering Graphics with AutoCAD*, PHI Learning Private Limited, New Delhi, Revised edition, 2010.
2. N. D. Bhatt and V. M. Panchal, *Engineering Drawing*, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Sham Tickoo, *AutoCAD 2013 for Engineers and designers*, Dreamtech Press, 2013.
2. M.H.Annaiah & Rajashekar Patil, *Computer Aided Engineering Drawing*, New Age International Publishers, 4th edition, 2012.

I B. Tech. – I Semester

(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics

COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Develop scripts using Scratch tool to simulate simple problems.

CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.

CO3. Function effectively as an individual and in team to foster knowledge and creativity.

CO4. Write and present a substantial technical report/ document effectively.

PRACTICAL EXERCISES:

1) a) Design a script in Scratch to simulate Airplane for take-off and land.

   b) Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.

2) a) Design a script in Scratch to calculate factorial of a given number.

   b) Design a script in Scratch to simulate Maze game. (Hint: To get Maze images refer http://inventwithScratch.com/downloads/)

3) a) Write a python script to read two integer numbers and perform arithmetic operations.

   b) Write a python script to evaluate following expressions by considering necessary inputs.

      i) $ax^2 + bx + c$ ii) $ax^5 + bx^3 + c$ iii) (ax + b) / (ax - b) iv) x - a / b + c

4) a) Write a python script to convert given decimal number into octal, hexa decimal and binary.

   b) Write a python script to read four integer values separated with commas and display the sum of those four numbers.

   c) Write a python script to print "SVEC" with prefix of ten spaces by using format().

5) a) Write a python script to calculate electricity bill based on following slab rates.

Consumption units	**Rate (in Rupees/Unit)**
0-100	4
101-150	4.6
151-200	5.2
201-300	6.3
Above 300	8

(Hint: To get Consumption units take current Meter reading, old meter reading from the user as input)

b) Print the following pattern using python script.

```
                1
              1 2 1
            1 2 3 2 1
          1 2 3 4 3 2 1
        1 2 3 4 5 4 3 2 1
```

6) a) Write a python script to read *N* student details like name, roll number, branch and age. Sort the student details based on their names and display.

b) Write a python script to delete duplicate strings from a list of strings. (Insertion order should maintain after deleting duplicate string).

c) Write a python script to read N number of student details into nested list and convert that as a nested dictionary.

7) a) Design a function that can perform sum of two or three or four numbers.

b) Write a python script to implement towers of Hanoi problem.

c) Write a Python function primesquare (l) that takes a nonempty list of integers and returns True if the elements of l alternate between perfect squares and prime numbers, and returns False otherwise. Note that the alternating sequence of squares and primes may begin with a square or with a prime. Here are some examples to show how your function should work.

```
>>>primesquare([4])
    True
    >>>primesquare([4,5,16,101,64])
    True
    >>>primesquare([5,16,101,36,27])
    False
```

8) a) Write a python script to perform arithmetic operations on numpyarrays.

b) Write a python script to perform following matrix operations using numpy.

i) Dot product ii) Matrix product iii) Determinant iv) Inverse

9) a) Write a python script to Create Pandas dataframe using list of lists.

b) Write a python script to load data from a CSV file into a Pandas DataFrame and perform basic operations on it.

10) a) Draw a Scatter Plot by considering an appropriate data set.

b) Draw histograms by considering an appropriate data set.

11) **Mini Project-1**

12) **Mini Project-2**

TEXT BOOK:

1. R. Nageswara Rao, *Core Python Programming*, 2nd edition, Dreamtech Press, 2018.

I B. Tech. - II semester

(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**

(Common to EEE, ECE, EIE, CE, ME, CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.

CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

DETAILED SYLLABUS:

UNIT- I: Fourier Series and Fourier Transforms (9 Periods)

Fourier series: Determination of Fourier coefficients, Euler's formulae, convergence of Fourier series (Dirichlet's conditions), Fourier series in $(0,2l),(-l,l)$; Fourier series of even and odd functions; Half-range Fourier sine and cosine expansions in $(0,l)$; Fourier integral theorem (statement only), Fourier sine and cosine integrals; Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

UNIT-II: Laplace Transforms (9 Periods)

Definition of Laplace transform, existence conditions, Laplace transform of standard functions, Properties of Laplace transforms, Laplace transforms of derivatives, Laplace transforms of integrals, multiplication by t^n, division by t, Laplace transform of periodic functions, Laplace transforms of unit step function and unit impulse function.

UNIT- III: Inverse Laplace Transforms (9 Periods)

Inverse Laplace transform by different methods; Convolution theorem (without proof), inverse Laplace transforms by convolution theorem; Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT- IV: Linear Algebra-I (Matrices) (9 Periods)

Rank of a matrix: echelon form; Linear systems of equations: solving system of Homogeneous and Non-Homogeneous equations; Eigen values and Eigen vectors of a matrix and properties (without proofs), Diagonalization of a matrix by orthogonal transformation; Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

UNIT- V: Linear Algebra-II (Vector Spaces) (9 Periods)

Vector spaces, Linear dependence and independence of vectors, basis, dimension, Linear transformations (maps), range and kernel of a linear map, rank and nullity, inverse of a linear transformation, rank-nullity theorem (without proof), matrix associated with a linear map.

Total Periods: 45

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Engineering Mathematics-II*, S. Chand & Company, 10th edition, 2016.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.
3. David Poole, *Linear Algebra: A Modern Introduction*, Brooks/Cole, 2nd edition, 2005.

REFERENCE BOOKS:

1. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw hill, 1st edition, 2017.
2. V. Krishna Murthy, Mainra and Arora: *An Introduction to Linear Algebra*, Affiliated East-West Press, 1993.

I- B. Tech. - II Semester

(19BT1BS02) **BIOLOGY FOR ENGINEERS**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.

CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.

CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

DETAILED SYLLABUS:

UNIT I – Living Organisms (6 Periods)

Comparison of biological organisms with man-made systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy

UNIT II – Proteins, Nucleic acids and Enzymes (6 Periods)

Biomolecules, structure and functions of proteins and nucleic acids, Industrial applications of enzymes, Fermentation and its industrial applications

UNIT III – Genetics and Molecular Biology (6 Periods)

Mendel's laws, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

UNIT IV – Recombinant DNA technology (6 Periods)

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

UNIT V – Human Physiology and Applied Biology (6 Periods)

Fundamentals of Human physiology, neurons, synaptic and neuromuscular junctions, Introduction to EEG, DNA fingerprinting, DNA Micro array and Genomics.

Total Periods: 30

TEXT BOOKS:

1. Rajiv Singal, Gaurav Agarwal, *Biology for Engineers*, CBS, 2019.

2. S. Sing and T. Allen, *Biology for Engineers*, Vayu Education of India, 2014.

REFERENCE BOOKS:

1. B. Alberts, A. Johnson et al., *The molecular biology of the cell*, Garland Science, 6th edition, 2014.

2. A. T. Johnson, *Biology for Engineers*, CRC press, 2011.

ADDITIONAL LEARNING RESOURCES:

1. Structure and function of Proteins: **https://nptel.ac.in/courses/104102016/16**

2. Enzyme catalysis: **https://nptel.ac.in/courses/103103026/module3/lec35/4.html**

3. Biochips: **https://nptel.ac.in/courses/112104029/3**

I B. Tech. – II Semester

(19BT2BS02) **APPLIED PHYSICS**

(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Fiber Optics; Acoustics and Ultrasonics; Kinematics and Kinetics; Thermal Physics; Modern Engineering Materials.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the knowledge of fiber optics, acoustics and ultrasonics to provide solutions for various engineering problems.

CO2. Analyze and solve the problems associated with kinetics, kinematics and thermal physics.

CO3. Demonstrate the knowledge on characteristics and applications of modern engineering materials.

DETAILED SYLLABUS:

Unit-I: FIBER OPTICS (8 Periods)

Introduction, structure of an optical fiber, total internal reflection, acceptance angle, acceptance cone and numerical aperture, modes of propagation, classification of optical fibers, V-number (qualitative), fabrication of optical fiber by double crucible technique, applications of optical fibers, sensors (temperature, displacement, liquid level detector).

UNIT-II: ACOUSTICS AND ULTRASONICS (9 Periods)

Acoustics - Introduction, classification of sound, sound intensity level (decibel), reverberation, reverberation time, absorption coefficient and its determination, Sabine's formula (qualitative), factors affecting acoustics and their remedies, basic requirements of an acoustically good hall.

Ultrasonics - Introduction to ultrasonic waves, production of ultrasonic waves by piezoelectric method, magnetostriction method, detection of ultrasonics (qualitative), industrial applications (ultrasonic welding, ultrasonic soldering and ultrasonic drilling).

UNIT-III: KINEMATICS AND KINETICS (10 Periods)

Kinematics of particles - Rectilinear motion (displacement-time curve, velocity-time curve, acceleration-time curve), curvilinear motion (velocity and angle of projection, equation of trajectory path, horizontal range) - inclined projection (equation of trajectory, maximum height, time of flight of projectile, horizontal range, angle of projection).

Kinetics - Bodies in rectilinear translation, kinetics of bodies rotating about fixed axis, work, energy, power, work-energy equation for translation.

UNIT-IV: THERMAL PHYSICS (8 Periods)

Introduction, modes of heat transfer (conduction, convection and radiation), coefficient of thermal conductivity, rectilinear flow of heat along a uniform bar, thermal conductivity of bad conductor (Lee's disc method), heat conduction through compound media (materials in series and parallel).

UNIT V: MODERN ENGINEERING MATERIALS (10 Periods)

Metallic glasses - Introduction, preparation of metallic glasses by RF sputtering technique, properties (structural, thermodynamic, mechanical, electrical, chemical and optical), applications of metallic glasses.

Shape memory alloys (SMA) – Introduction, shape memory effect and its types, characteristics of SMA, properties of NiTi alloy, applications of SMA.

Composites - Introduction, types and applications.

Total Periods: 45

TEXT BOOKS:

1. M. N. Avadhanulu, P. G. Kshirsagar, T. V. S Arun Murthy, *A Textbook of Engineering Physics,* S. Chand Publications, 11th edition, 2019.
2. S. S. Bhavikatti and K. G. Rajashekarappa, Engineering Mechanics, New Age International Publishers, 2nd edition, 2015.

REFERENCE BOOKS:

1. B. K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Learning, 2012.
2. Brij Lal and N. Subrahmanyam, *Heat and Thermodynamics,* S. Chand and Company Ltd., 1995.

I B. Tech. – II Semester

(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCREPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.

CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

DETAILED SYLLABUS:

Unit-I: Principles of Electrical Systems-I (9 Periods)

Basic electrical sources: DC-Battery, AC sources–Single loop generator; Single phase and three phase supply; Electrical circuit elements (R, L and C), Ohm's law, Kirchhoff's laws, Representation of sinusoidal waveforms, peak and RMS values, phasor representation, reactive power, apparent power, real power, energy and power factor.

Unit-II: Principles of Electrical Systems-II (9 Periods)

Significance of Power factor and power factor correction, most economical power factor. Typical layout of electrical grid; Typical layout and operation of Hydro, Thermal and Solar Power Plants; Fuse, circuit breaker (MCB, MCCB, RCCB, ELCB), relay (elementary treatment); Inverter and UPS (block diagram approach only). Earthing – importance of earthing, pipe earthing and plate earthing; Safety measures. Energy Efficiency (Star rating) standards by BEE.

Unit-III: Transformers and AC Machines **(9 Periods)**

Construction and working of a single phase transformer, EMF Equation; Construction and working of three phase induction motor, torque equation, torque-slip characteristics, applications; construction and working of a resistor start &capacitor start and run single phase induction motor, applications; Construction and working of synchronous machine, applications.

UNIT-IV: Semiconductor Devices **(10 Periods)**

PN Junction diode, Characteristics, applications - half wave and full wave rectifier. Zener diode, characteristics, application–Regulator. BJT- operation, configurations, characteristics, applications - switch and amplifier.

UNIT-V: Op-Amps **(8 Periods)**

Operational Amplifier: Block diagram of Op-Amp, equivalent circuit, Op-Amp AC and DC Characteristics, Inverting and Non-Inverting modes. Applications - Adder, Comparator, Integrator and Differentiator.

Total Periods: 45

TEXT BOOKS:

1. Ashfaq Hussain*, Fundamentals of Electrical Engineering,* Dhanpatrai & Co. (P) Ltd., 3rd edition, New Delhi, 2009.
2. R. L. Boylestad and Louis Nashelsky, *Electronics Devices and Circuits*, PHI, 11th edition, 2009.

REFERENCE BOOKS:

1. M. S. Naidu, S. Kamakshaiah, *Introduction to Electrical Engineering,* Tata McGraw-Hill Education, New Delhi, 2007.
2. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th edition, 2011.

I B. Tech. – II Semester

(19BT20101) **CIVIL ENGINEERING MATERIALS AND CONCRETE TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Engineering Chemistry

COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Miscellaneous Materials in Construction; Cement, Admixtures and Aggregates; Fresh and Hardened Concrete; Elasticity, Shrinkage, Creep and Concrete Mix Design.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Analyze civil engineering materials, fresh and hardened concrete using different tools/techniques for civil engineering construction considering codes of practice, environment and sustainability.

CO2 Design a concrete mix for civil engineering construction considering appropriate codes of practice.

DETAILED SYLLABUS:

UNIT – I: STONES, BRICKS AND TILES (9 Periods)

Stones: Properties of building stones and structural requirements, Classification of stones, Stone quarrying, Blasting and dressing of stones.

Bricks and Tiles: Composition of good brick earth, Manufacture of bricks, Qualities of a good brick, Efflorescence in bricks, Classification of bricks, Characteristics of good tile, Manufacturing methods, Types of tiles.

UNIT – II: TIMBER AND MISCELLANEOUS MATERIALS FOR CONSTRUCTION

(8 Periods)

Timber: Structure, Properties, Seasoning of timber, Classification of various types of wood used in buildings, Defects in timber, Decay of timber, Mechanical treatment, Alternative materials for wood, Paints, Varnishes, Bituminous wooden products in construction.

Miscellaneous Materials for Construction: Use of Materials like galvanized iron, steel, aluminum, glass, bituminous materials, rubber, fiber–reinforced plastics, ceramic products, asbestos and their quality; Modern building materials; Building materials for low cost housing, Utilisation of waste for alternative building materials, Sustainable materials in construction.

UNIT – III: CEMENT, ADMIXTURES AND AGGREGATES (9 Periods)

Cement and Admixtures: Ingredients of cement, Manufacture of OPC, Types of cement and their properties, Grades of Cement, Various field and laboratory tests on cement, Admixtures - mineral admixtures, chemical admixtures.

Aggregates: Classification of aggregate, Physical properties, Mechanical properties, Bond strength, Bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction, Sieve analysis, Gradation, Maximum aggregate size.

UNIT - IV: FRESH AND HARDENED CONCRETE (9 periods)

Fresh Concrete: Ingredients of cement concrete and their importance, Manufacture of concrete, Workability, Factors affecting, Measurement of workability, Setting times of concrete, Effect of time and temperature on workability, Segregation and bleeding, Ready mix concrete, Quality of mixing water.

Hardened Concrete: Water/Cement ratio, Abram's Law, Gel space ratio, Curing, Nature of strength of concrete, Maturity concept, Strength in tension and compression, Factors affecting strength, Tests on hardened concrete, Relation between compressive and tensile strength, Non-destructive testing methods – Rebound hammer, ultrasonic pulse velocity method, codal provisions.

UNIT – V: ELASTICITY, SHRINKAGE, CREEP AND CONCRETE MIX DESIGN

(10 Periods)

***Elasticity, Shrinkage and Creep*:** Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Shrinkage – Types, factors; Creep of concrete - Factors, Relation between creep and time, Effects.

Concrete Mix Design: Factors in the choice of mix proportions, Durability of concrete, Quality control of concrete, Statistical methods, Acceptance criteria, Proportioning of concrete mixes by various methods – ACI method and IS 10262 method.

Total Periods: *45*

TEXT BOOKS

1. S. K. Duggal, *Building Materials*, New Age International Publishers, 4th edition, 2010.

2. M. S. Shetty, *Concrete Technology*, S. Chand and Company Ltd., 7th edition, 2011.

REFERENCES

1. P. C. Varghese, *Building Materials*, Prentice-Hall of India Private Ltd., New Delhi, 2011.

2. A. M. Neville, *Properties of Concrete*, 5th edition, John Wiley and Sons, New Delhi, 2012.

ADDITIONAL LEARNING RESOURCES

1. M. L. Gambhir, *Concrete Technology*, 3rd edition, Tata McGraw-Hill Publishers, New Delhi, 2008.

2. A. R. Santha Kumar, *Concrete Technology*, 7th edition, Oxford University Press, New Delhi, 2011.

I B. Tech. – II Semester
(19BT20102) **ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; Simple Stresses and Strains; Thin and Thick Cylinders.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze engineering problems related to statics of particles and rigid bodies; friction; sectional properties; simple stresses and strains, for effective solutions.

CO2. Design cylinders for different engineering applications ensuring safety.

DETAILED SYLLABUS:

UNIT – I: STATICS **(10 Periods)**

Statics of Particles: Basic concepts, System of units, System of concurrent coplanar forces in plane, Resultant of forces, Laws of mechanics, Equilibrium of forces, Lami's theorem, Vectorial representation of forces.

Statics of Rigid Bodies: Moment of a force, Varignon's theorem, Moment of a couple, Vectorial representation of moments and couples, Coplanar non-concurrent forces, Equilibrium of rigid bodies, Types of supports and loads, Types of frames, Perfect frame analysis, Method of joints, Method of sections, Principle of virtual work.

UNIT – II: FRICTION **(8 Periods)**

Frictional force, Types of friction, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Applications: Body on horizontal/inclined plane, Two bodies in contact, Ladder friction, Wedge friction.

UNIT – III: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA

(09 Periods)

Centroids of simple and composite areas, Centre of gravity of bodies, Theorems of Pappus and Guldinus, Parallel axis and perpendicular axis theorems, Moment of Inertia of Composite areas, Radius of gyration – Section modulus, Mass Moment of Inertia of simple and composite masses.

UNIT – IV: SIMPLE STRESSES AND STRAINS (10 Periods)

Elasticity and plasticity, Types of stresses and strains, Hooke's law, Stress-strain diagram for mild steel, Working stress, Factor of safety, Lateral strain, Poisson's ratio, Volumetric strain, Types of elastic moduli and relations, Bars of varying section, Composite bars, Temperature stresses, Strain energy - Gradual, sudden and impact loadings, Simple applications.

UNIT – V: THIN AND THICK CYLINDERS (8 Periods)

Thin Cylinders: Thin cylindrical shells, Longitudinal and circumferential stresses; Hoop, Longitudinal and volumetric strains; Changes in dimensions of thin cylinders.

Thick Cylinders: Lame's theory, Distribution of hoop and radial stresses across thickness, Design of thick cylinders, Compound cylinders, Difference of radii for shrinkage.

Total Periods: 45

TEXT BOOKS:

1. S. S. Bhavikatti and K. G. Rajashekarappa, *Engineering Mechanics*, New Age International (P) Ltd., 3rd edition, 2009.
2. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications Pvt. Ltd., 2001.

REFERENCE BOOKS:

1. J. L. Meriam and L. G. Kraige*, Engineering Mechanics: Statics (Vol. 1), Dynamics (Vol. 2),* John Wiley & Sons Ltd*.,* 5th edition, 2008*.*

2. S. Rajasekaran and G. Sankarasubramanian, *Engineering Mechanics – Statics and Dynamics*, Vikas Publishing House Pvt. Ltd., 3rd edition, 2009.

3. Bhavikatti, S. S., *Strength of Materials*, Vikas Publishing House, 3rd edition, 2010.

4. Junnarkar, S. B. and Shah, H. J., *Mechanics of Structures – Vol. I (Strength of Materials)*, Charotar Publishing House Pvt. Ltd., 27th Revised and enlarged edition, 2008.

ADDITIONAL LEARNING RESOURCES:

1. Arthur P. Boresi and Richard J. Schmidt, *Engineering Mechanics - Statics and Dynamics,* Cengage Learning, 1st edition, Indian edition, 2008.

2. K. Vijaya Kumar Reddy and J. Suresh Kumar, *Singer's Engineering Mechanics - Statics and Dynamics*, BS Publications, 3rd edition, 2010.

3. S. Timoshenko, D. H. Young and J. V. Rao, *Engineering Mechanics*, Tata McGraw-Hill Education Pvt. Ltd., Revised 4th edition, Special Indian edition, 2007.

4. Rajput, R. K., *Strength of Materials (Mechanics of Solids)*, S. Chand & Company LTD, 5th edition, 2006.

5. Ramamrutham, S. and Narayanan, R., *Theory of Structures,* 9th edition, Dhanpat Rai Publishing Co. Ltd., 2014.

6. Basu, A. R., *Strength of Materials,* Dhanpat Rai & Co. (P) LTD., 2nd Revised edition, 2015.

I B. Tech. – II Semester
(19BT2BS31) **APPLIED PHYSICS LAB**
(Common to CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Determination of Moment of Inertia, Elastic Moduli, and Thermal properties of materials; Estimation of carrier concentration and energy gap of a semiconductor; Verification of Newton's Law of Cooling; Characteristics of Optical Fiber;

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.

CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.

CO3. Work independently and in teams to solve problems with effective communication.

A minimum of **Ten** experiments are to be conducted among the following:

List of Experiments:

1. Determination of moment of inertia of a bar and acceleration due to gravity - Compound Pendulum.
2. Moment of inertia of a Flywheel.
3. Bifilar Pendulum - Moment of inertia of a rectangular body.
4. Melde’s Experiment – Determine the frequency of electrically driven tuning fork.
5. Determination of thermal conductivity of a good conductor (Forbe’s Apparatus).
6. Determination of thermal conductivity of a bad conductor (Lee’s disc method).
7. Thermal Expansion of Solids - Bimetallic Strip.
8. Study the characteristics of an optical Fiber.

9. Verification of Newton's Law of Cooling for any two liquids.
10. Determination of number of charge carriers per unit volume and hall coefficients of a given material using Hall Effect.
11. Rigidity Modulus of a material of a wire - Torsional Pendulum
12. Thermocouple - Seebeck Effect.
13. Determine the energy gap of a material by varying temperatures.

REFERENCES:

1. Balasubramanian S, Srinivasan M.N and Ranganathan, *A Text book of Practical Physics,* R, Sultan Chand & Sons, 2017.

https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1

I B. Tech. – II Semester

(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.

COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of the course, student will be able to:

CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3. Work independently and in teams to solve problems with effective communication.

List of Experiments:

Minimum Ten experiments are to be conducted.

1. Measurement of electrical quantities (AC & DC) using Voltmeter, Ammeter and Wattmeter.
2. Verification of Ohm's law and Kirchhoff's laws.
3. Circuit
   (a) with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
   (b) With two lamps controlled by two switches with PVC surface conduit system.
   (c) for Stair case wiring and Go down wiring.
4. Measurement of Power factor and it's improvement.
5. Load test on 1-Phase Transformer.
6. Brake test on 3-Phase Induction Motor.
7. Brake test on 1- phase induction motor.
8. VI Characteristics of PN and Zener Diodes.
9. Ripple factor and load regulations of rectifier with and without filters.
10. Input and output characteristics of CE configuration.

11. Design of inverting and non-inverting amplifiers using op-amp.
12. Design of voltage summer and integrator using op-amp.
13. Soldering practice.

REFERENCES BOOKS/ LAB MANUALS:

1. P. S. Dhogal, *Basic Practicals in Electrical Engineering*, Standard Publishers, 2004.
2. Yannis Tsividis, *A First Lab in Circuits and Electronics*, Wiley, 1st edition., 2001

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, Virtual Electric Circuits Lab, A initiative of MHRD under NMEICT.
2. www.vlab.co.in, Basic Electronics Lab, A initiative of MHRD under NMEICT.
3. https://nptel.ac.in/courses/117106108/
4. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/
5. https://nptel.ac.in/courses/108105017/
6. https://nptel.ac.in/courses/108108112/
   https://nptel.ac.in/courses/117107094/

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on various materials, manufacturing process, hand and power tools involved in different engineering applications.
CO2. Identify and analyse the functions of different automobile parts.
CO3. Design and model different prototypes in the carpentry, fitting and sheet metal operations and interpret the information of the components through drawings.
CO4. Apply the basic Engineering knowledge to design, analyse and manufacture prototypes using 3D printing technology
CO5. Work independently or as a team to solve a problem with effective communication.

DETAILED SYLLABUS:

FITTING: Conduct a detailed study on various aspects in fitting trade which includes the details of fitting operations, safety precautions, types of tools, tool holders, miscellaneous tools, care and maintenance of hand tools, marking and measurement tool, and finishing tool.

List of Exercises :

1. Make a square/half round mating from the given MS work pieces
2. Make a V- mating from the given MS work pieces
3. Make a dovetail mating from the given MS work pieces

CARPENTRY: Conduct a detailed study on various aspects in carpentry trade which includes the details of types of wood, carpentry tools, wood working techniques, types of joints, safety precautions, and care and maintenance of tools.

List of Exercises:

4. Prepare a cross lap joint
5. Prepare dovetail / bridle joints
6. Prepare a Mortise and Tenon joint.

SHEET METAL FORMING: Conduct a detailed study on various aspects in sheet metal forming which includes the details of sheet materials, hand tools, sheet metal fabrication, and safety and precautions

List of Exercises:

7. Fabricate a rectangular tray as per the dimensions
8. Fabricate square vessel/cylinder as per the dimensions
9. Fabricate a Funnel as per the dimensions

FOUNDRY: Conduct a detailed study on various aspects in foundry which includes the details of moulding sand, properties of moulding sand, types of patterns and pattern, materials, foundry tools, and safety and precautions

List of Exercises:

10. Prepare a sand mold, using the given single piece pattern (stepped pulley/cube)
11. Prepare a sand mold, using the given split piece pattern (pipe bent/dumbbell)

DEMONSTRATION:

12. Demonstrate the dismantling and assembling of various two wheeler parts
13. Demonstrate the usage of power tools.
14. Demonstrate the plumbing operation and identify the essential tool and materials required for plumbing.
15. Demonstrate the working of 3D printer

Note: Student shall perform any **Twelve Exercises**

REFERENCE BOOKS/LABORATORY MANUALS:

1. P. Kannaiah and K. L. Narayana, *Workshop Manual*, SciTech Publishers, 2009.
2. K. Venkata Reddy, *Workshop Practice Manual*, BS Publications, 2008.
3. V. Ramesh Babu, *Engineering Workshop Practice*, V R B Publishers Private Limited, 2009.

ADDITIONAL LEARNING RESOURCES:

1. R. K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012.
2. Kalpakjian, Serope, *Manufacturing Engineering and Technology*, Pearson Education, 7th edition, 2014.

I B. Tech. – II Semester
(19BT20131) **ENGINEERING GEOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Study of physical properties and identification of minerals and rocks; Rock forming minerals; Ore forming minerals; Igneous rocks; Sedimentary rocks; Metamorphic rocks; Geological maps; Problems on structural geology; Norm form calculations; Resistivity survey.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Identify minerals and rocks using appropriate tools/techniques in order to understand the impact of geological features on civil engineering projects

CO2. Analyze structural geology problems for feasible inferences associated with civil engineering projects.

CO3. Develop and interpret geological sections from the geological maps for the benefit of civil engineering projects.

CO4. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on geological information.

DETAILED SYLLABUS:

Introduction to Engineering Geology in Civil Engineering, Mineralogy (properties and identification of minerals), Petrology (properties and identification of rocks), Geological maps, Structural geology problems and Geophysical studies.

LIST OF PRACTICAL EXERCISES:

A) MINERALS

1. Study of physical properties and identification of rock forming minerals
2. Study of physical properties and identification of ore forming minerals

B) ROCKS

3. Study of physical properties and identification of common igneous rocks
4. Study of physical properties and identification of common sedimentary rocks
5. Study of physical properties and identification of common metamorphic rocks

C) GEOLOGICAL MAPS

6. Study of geological maps, drawing and interpretation of geological sections in horizontal beds
7. Study of geological maps, drawing and interpretation of geological sections in vertical beds
8. Study of geological maps, drawing and interpretation of geological sections in beds with fault plane
9. Study of geological maps, drawing and interpretation of geological sections in beds with folding

D) STRUCTURAL GEOLOGY PROBLEMS

10. Thickness
11. Strike and dip
12. Bore hole

E) NORM FORM CALCULATIONS

13. Normative minerals analysis(not for the examination)

F) GEOPHYSICAL STUDIES

14. Electrical resistivity survey (not for the examination)
15. Seismic surveys (not for the examination)

REFERENCE BOOKS/LABORATORY MANUALS:

1. *"Engineering Geology Laboratory Manual (SVEC 19 Regulations)",* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

I B. Tech. - II Semester

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze the techniques of listening, speaking, reading, writing and apply through functional English to communicate effectively with the engineering community and society.

DETAILED SYLLABUS:

UNIT I - **FUNCTIONAL ENGLISH:** **(6 periods)**

Introduction - Functional Spoken English; Self Introduction; **Listening – Speaking:** Do's and Don'ts; **Expressing:** Ability / Admiration / Agreement / Annoyance / Appreciation / Pleasure / Sarcasm / Satisfaction / Surprise / Approval / Certainty / Doubt / Gratitude / Possibility / Fear / Worry / Condolences; **Asking for:** Advice / Clarification / Direction / Information / Permission; **Making:** Predictions / recommendations.

UNIT II -**VOCABULARY BUILDING:** **(6 periods)**

Introduction: Vocabulary for day-to-day conversations; Vegetables / Groceries / Fruits / Weather; Parts of a Human body / Dresses / Furniture / Relations; Birds / Cries of Animals; Food / Hospitality / Houses / Rooms / Tools; Airport / News Paper / Books / Gems; Corporate Vocabulary / Jobs / Occupations / Diseases; British / American spelling; Slang Words and Technical Jargon.

UNIT III -**FUNCTIONAL GRAMMAR - I:** **(6 periods)**

Parts of Speech, Verb forms; Tenses; Voice; Speech.

UNIT IV -**FUNCTIONAL GRAMMAR - II**: **(6 periods)**

Universal Auxiliaries; Sentence Structure - WH - Questions - How to frame Questions and give answers; Question Tags; Subject and verb agreement; Spotting Errors.

UNIT V –COMMUNICATION SKILLS: **(6 periods)**

Polite, Courteous and Diplomatic expressions; Good Manners and Etiquette; Conversation Techniques; Narrating Stories.

Total Periods: 30

TEXT BOOKS:

1. L. Adinarayana and V. Prakasam, *Spoken English*, Neelkamal Publications Pvt. Ltd., New Delhi, 2008.
2. Ram Bhasker Raju, *The Complete Book on Spoken English*, Goutham Buddha Publications, Hyderabad, 2002.

REFERENCE BOOKS :

1. Sabina Pillai, *Spoken English for my World,* Oxford University Press, New Delhi, 2016.

2. K. R. Lakshminarayanan, *Speak in English,* Scitech Publications, Chennai, 2009.

ADDITIONAL LEARNING RESOURCES

1. https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.
2. https://www.fluentu.com/blog/english/websites-to-learn-english