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 JNTU Anantapur, Approved by AICTE,
Accredited by NBA, NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.**

Sri Manchu Narayanaswamy Naidu Building
(Freshman Block)

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CIVIL ENGINEERING

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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)

and

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) Civil Engineering
2) Computer Science and Business Systems
3) Computer Science and Engineering
4) Computer Science and Engineering (Artificial Intelligence)
5) Computer Science and Engineering (Data Science)
6) Computer Science and Systems Engineering
7) Electrical and Electronics Engineering
8) Electronics and Communication Engineering
9) Electronics and Instrumentation Engineering
10) Information Technology
11) 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, Universal Human Values	--
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 **for THREE HOURS duration** 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 for 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.
		40	10	Assignments (Internal evaluation).	One Assignment shall be given to the student for 10 marks during the semester and Assignment Marks finalized.

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
		30		Mid-term Examination of 2 hours duration (Internal evaluation).	Two mid-term examinations each for 30 marks are to be conducted. For a total of 30 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 8 marks, out of which 3 are to be answered and evaluated for 24 marks. There shall also be 6 short answer questions each of 01 mark, all are to be answered and evaluated for 6 marks.
2	Laboratory	50		Semester-end Lab Examination for 3 hours duration (External evaluation)	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.
		50	30	Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation).	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.
			20	Practical test (Internal evaluation).	
3	Internship	100		Semester-end Examination	The evaluation shall be done by the Department Evaluation Committee (**DEC**) at the end of the semester as given in 12.2.1.
4	Open Elective (MOOC)	100		Semester-end Examination for **3 hours duration**	The evaluation shall be done by the department through ONLINE with 50 multiple choice questions.
5	Socially Relevant Project	100	50	Internal Evaluation	Shall be evaluated as given in 12.2.2(i)
			50	Semester-end evaluation	Viva-Voce examination shall be conducted at the end of the semester as given in 12.2.2(ii)
6	Mandatory Courses	40		Internal Evaluation	Shall be evaluated as given in 12.2.4

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
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) <u>Semester-end Evaluation:</u> 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) <u>Internal Evaluation:</u> 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) <u>Semester-end Evaluation:</u> 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. Recounting/Revaluation/Personal Verification/Challenging Evaluation:

Students shall be permitted to apply for **Recounting/Revaluation/Personal Verification/Challenging Evaluation** of the Semester-end examination answer scripts within a stipulated period after payment of the prescribed fee. After completion of the process of **Recounting/Revaluation/Personal Verification/ Challenging Evaluation**, the 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 25 credits 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 42 credits 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 25 credits 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: <u>The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council, SVEC (Autonomous).</u>

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. Re-Registration for Improvement of Internal Marks:

Following are the conditions to avail the benefit of improvement of internal marks.

23.1 The candidate should have completed the 4 years of B.Tech course work and obtained examinations results from I B.Tech I Semester to IV B.Tech II semester.

23.2 Out of the courses the candidate has failed in the examinations due to internal evaluation marks secured being less than 40%, the candidate shall be given a chance for improvement of internal evaluation marks in the failed theory courses.

23.3 This provision is only for Theory courses. The candidate has to register for the chosen courses and fulfil the academic requirements (i.e. a student has to attend the classes regularly and appear for the mid-examinations and satisfy the attendance requirements to become eligible for appearing at the semester-end examinations).

23.4 For each course, the candidate has to pay a fee of Rs. 10,000/- and the amount is to be remitted in the form of D.D. in favor of the Principal, Sree Vidyaniketan Engineering College payable at Tirupati along with the requisition through the concerned Head of the Department.

23.5 In the event of availing the provision of Improvement of Internal evaluation marks, the internal evaluation marks as well as the Semester-end Examinations marks secured in the previous attempt(s) for the re-registered courses shall stand cancelled.

24. 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.

25. 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 will 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 will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional	Expulsion from the examination hall and cancellation

	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.	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.
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/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 will 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.

SVEC19 CURRICULUM
Course Structure for B.Tech. in Civil Engineering
(Effective from the Academic year 2019-20 onwards)

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	L	T	P	Total	Credits (C)	Int. Marks	Ext. Marks	Total Marks
			Contact Periods per Week					**Scheme of Examination Max. 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	L	T	P	Total	Credits (C)	Int. Marks	Ext. Marks	Total Marks
			Contact Periods per Week					**Scheme of Examination Max. 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				Credits (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.	19BT30101	Construction, Planning and Project Management	3	-	-	3	3	40	60	100
3.	19BT30102	Fluid Mechanics	3	-	-	3	3	40	60	100
4.	19BT30103	Mechanics of Solids	3	1	-	4	4	40	60	100
5.	19BT30104	Surveying	3	-	-	3	3	40	60	100
6.	19BT3HS31	Soft Skills Lab	-	-	2	2	1	50	50	100
7.	19BT30131	Civil Engineering Materials and Construction Technology Workshop	-	-	2	2	1	50	50	100
8.	19BT30132	Strength of Materials Lab	-	-	2	2	1	50	50	100
9.	19BT30133	Surveying Lab	-	-	2	2	1	50	50	100
		Total	**15**	**2**	**8**	**25**	**21**	**400**	**500**	**900**
10.	19BT315AC	Design Thinking	2	-	-	2	-	-	-	-

II B.Tech II–Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits (C)	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1.	19BT40101	Engineering Hydrology	3	-	-	3	3	40	60	100
2.	19BT40102	Environmental Engineering	3	-	-	3	3	40	60	100
3.	19BT40103	Hydraulic Engineering	3	-	-	3	3	40	60	100
4.	19BT40104	Soil Mechanics	3	-	-	3	3	40	60	100
5.	19BT40105	Structural Analysis	3	1	-	4	4	40	60	100
6.	**Open Elective-2**		3	-	-	3	3	40	60	100
7.	19BT40131	Environmental Engineering Lab	-	-	2	2	1	50	50	100
8.	19BT40132	Fluid Mechanics and Hydraulic Machinery Lab	-	-	2	2	1	50	50	100
9.	19BT40133	Geotechnical Engineering Lab	-	-	2	2	1	50	50	100
		Total	**18**	**1**	**6**	**25**	**22**	**390**	**510**	**900**
10.	19BT3MC01	Environmental Science	2	-	-	2	-	40	-	40

III B.Tech I–Semester

S. No.	Course Code	Course Title	L	T	P	Total	Credits (C)	Int. Marks	Ext. Marks	Total Marks
			Contact Periods per Week					Scheme of Examination Max. Marks		
1.	19BT50101	Irrigation Engineering and Hydraulic Structures	3	-	-	3	3	40	60	100
2.	19BT50102	Foundation 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.	**Interdisciplinary Elective- 1**									
	19BT50443	Principles of Image Processing	3	-	-	3	3	40	60	100
	19BT60205	Energy Audit, Conservation and Management								
	19BT70303	Computational Fluid Dynamics								
	19BT50105	Construction Equipment and Automation								
	19BT50106	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	Socially Relevant Project-1	-	-	-	-	1	50	50	100
		Total	18	-	4	22	21	390	510	900
10.	19BT503AC	Foundations of Entrepreneurship	2	-	-	2	-	-	-	-

III B.Tech II–Semester

S. No.	Course Code	Course Title	L	T	P	Total	Credits (C)	Int. Marks	Ext. Marks	Total Marks
			Contact Periods per Week				Credits (C)	Scheme of Examination Max. Marks		
1.	19BT6HS02	Organizational Behavior	3	-	-	3	3	40	60	100
2.	19BT60101	Steel Structures	3	-	-	3	3	40	60	100
3.	**Professional Elective–1**									
	19BT60102	Advanced Structural Analysis	3	-	-	3	3	40	60	100
	19BT60103	Advanced Surveying								
	19BT60104	Air and Noise Pollution and Control								
	19BT60105	Architecture and Town Planning								
	19BT60106	Ground Improvement Techniques								
	19BT60107	Urban Stormwater Management								
	19BT60108	Railway Engineering								
4.	**Professional Elective–2**									
	19BT60109	Advanced Reinforced Cement Concrete Structures	3	-	-	3	3	40	60	100
	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**									
	19BT60116	Earthquake Resistant Design of Structures	3	-	-	3	3	40	60	100
	19BT60117	Highway Construction and Maintenance								
	19BT60118	Industrial Wastewater Treatment								
	19BT60119	Infrastructure Development and Management								
	19BT60120	Land Survey and Real Estate Development								
	19BT60121	Soil Dynamics and Machine Foundations								
	19BT60122	Sustainable Water Resources Development								
6.	**Interdisciplinary Elective–2**									
	19BT60313	Optimization Techniques	3	-	-	3	3	40	60	100
	19BT60343	Thermodynamics and Heat Transfer								
	19BT60123	Fire Engineering								

	19BT60124	Intelligent Transportation Systems								
	19BT60125	Smart Materials and Structures								
7.	19BT61531	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-2	-	-	-	-	1	50	50	100
		Total	**18**	**1**	**4**	**23**	**22**	**390**	**510**	**900**
10.	19BT5MC01	Universal Human Values	2	-	-	2	-	40	-	40

IV B.Tech I–Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits (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	3	-	-	3	3	40	60	100
4.	**Professional Elective–4**									
	19BT70103	Advanced Foundation Engineering	3	-	-	3	3	40	60	100
	19BT70104	Advanced Steel Structures								
	19BT70105	Environmental Hydraulics								
	19BT70106	Pavement Analysis and Design								
	19BT70107	Prestressed Concrete								
	19BT70108	River Engineering and River Basin Management								
	19BT70109	Structural Health Monitoring								
5.	**Professional Elective–5**									
	19BT70110	Analysis and Design of Composite Structures	3	-	-	3	3	40	60	100
	19BT70111	Bridge Engineering								
	19BT70112	Civil Infrastructure for Smart City Development								
	19BT70113	Environmental Impact Assessment and Management								
	19BT70114	Geotechnics for Underground Structures								
	19BT70115	Traffic Engineering and Management								
	19BT70116	Water Resources Systems Planning and Management								
6.	19BT7MOOC	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	**15**	**-**	**4**	**19**	**22**	**300**	**600**	**900**
10.	19BT701AC	Spread Sheet Applications in Civil Engineering	-	-	2	2	-	-	-	-

* Student shall undertake the Internship in Industry/National Laboratories/Academic Institutions for a minimum period of 4 weeks.*

IV B.Tech II–Semester

S. No.	Course Code	Course Title	Contact Periods per Week				Credits (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 and 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 Accounting 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	19BT4HS13	Indian Tradition and Culture
19BT4HS14	Constitution of India	19BT40106	Disaster Mitigation and Management
19BT40205	Reliability and Safety Engineering	19BT40107	Sustainable Engineering
19BT50107	Environmental Pollution and Control	19BT40108	Contract Laws and Regulations
19BT50108	Planning for Sustainable Development	19BT40306	Global Strategy and Technology
19BT50109	Rural Technology	19BT40307	Management Science
19BT50505	Ethical Hacking	19BT40504	Cyber Laws and Security
19BT51207	AI in Healthcare	19BT50208	Intellectual Property Rights
19BT51506	Bioinformatics	19BT50409	Green Technologies

MINOR/HONORS DEGREE

IN GREEN TECHNOLOGY AND SUSTAINABLE ENGINEERING

Semester	COURSE CODE	Course Title	Contact Periods per week				C
			L	T	P	Total	
III B.Tech. I-Sem	19BT40107	Sustainable Engineering	3	-	-	3	3
	19BT50409	Green Technologies	3	-	-	3	3
III B.Tech. II-Sem	19BT60126	Environmental Sustainability	3	-	-	3	3
	19BT60127	Sustainable Energy Systems	3	-	-	3	3
	19BT60128	Sustainability in The Built Environment	3	-	-	3	3
IV B.Tech. I-Sem	19BT70117	Environmental Economics	3	-	-	3	3
	19BT70118	Sustainable Cities	3	-	-	3	3
	19BT70119	Sustainable Design of Technology Systems	3	-	-	3	3

Note: Students opting for the above Minor/Honors Degree shall not register for the courses "Green Technologies" and "Sustainable Engineering" offered under open electives.

I B. Tech. - I Semester
(19BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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.

(19BT1BS04) ENGINEERING CHEMISTRY

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

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 CE, ME, CSE, CSSE, IT and CSBS)

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: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.

CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.

CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

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 CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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 CE, ME, CSE, CSSE and IT)

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 CE, ME, CSE, CSSE, IT and CSBS)

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 Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.

CO2 Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.

CO3 Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.

CO4 Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5 Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

*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 CE, ME, CSE, CSSE and IT)

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 applications.

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

CO3: Work independently / in groups & communicate effectively in oral and written forms.

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

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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 CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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 CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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 CE, ME, CSE, CSSE, IT and CSBS)

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 and 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.

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

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

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.

(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.

(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 and 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 CE, ME, CSE, CSSE and IT)

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

PRE-REQUISITES: Physics at intermediate level.

COURSE DESCRIPTION: 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 CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO6. Work independently / in groups & communicate effectively in oral and written forms.

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.

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT and CSBS**)**

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. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

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

II B. Tech. - I Semester
(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**
(Common to CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Numerical solutions of equations; interpolation; numerical differentiation and integration; random variables; mathematical expectations; probability distributions; test of hypothesis.

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

CO1 Analyse the data and develop skills to solve equations and integrals by applying numerical methods.

CO2 Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

DETAILED SYLLABUS
UNIT-I: NUMERICAL SOLUTIONS OF EQUATIONS AND INTERPOLATION
(8 Periods)

Solutions of algebraic and transcendental equations: Regula-falsi method, Newton-Raphson method; Interpolation: Forward and backward differences, interpolation using Newton's forward and backward difference formulae, Lagrange's interpolation formula, partial fractions using Lagrange's interpolation formula.

UNIT- II: NUMERICAL DIFFERENTIATION AND INTEGRATION   **(9 Periods)**

Numerical differentiation using Newton's forward and backward interpolation formulae; Numerical integration using Simpson's $1/3^{rd}$ and $3/8^{th}$ rules; Numerical solutions of first order ordinary differential equations using Taylor's series method, fourth order Runge-Kutta method.

UNIT-III: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS
(8 Periods)

Random Variables: Discrete and continuous random variables, distribution function of random variable, properties, probability mass function, probability density function; mathematical expectation, properties of mathematical expectation, mean and variance.

UNIT-IV: PROBABILITY DISTRIBUTIONS   **(9 Periods)**

Discrete probability distributions: Binomial, Poisson- mean, variance, standard deviation (without derivations); Continuous probability distributions: Normal, uniform and exponential distributions- mean, variance, standard deviation (without derivations), area under the normal curve.

UNIT-V: TEST OF HYPOTHESIS   **(11 Periods)**

Population and sample, parameter and statistic, null and alternative hypothesis, Type I and Type II errors, level of Significance, critical region, degrees of freedom; Large

sample test: Tests of significance for proportions and means; Small sample test: Student's t-test- single mean, difference of means; F-test for equality of population variance; Chi-Square test for independence of attributes.

Total Periods: 45

Topics for self-study are included in lesson plan

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Mathematical Methods,* S. Chand & Company, 5th edition, 2016.
2. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Probability and Statistics,* S. Chand & Company, 5th edition, 2016.

REFERENCE BOOKS:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th edition, 2017.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, *Numerical Methods*, S. Chand and Company, 2nd edition, Reprint 2012.
3. S. C. Gupta and V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand and Sons Publications, 11th edition, 2012.

(19BT30101) **CONSTRUCTION, PLANNING AND PROJECT MANAGEMENT**

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

PRE-REQUISITES: Course on Civil Engineering Materials and Concrete Technology

COURSE DESCRIPTION: Masonry and Foundations; Building Components; Finishings; Shoring; Scaffolding; Form Work; Organization and Resource Management; Project Management; Network Development; PERT and CPM.

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

CO1 Characterize masonry, foundations and building components using various tools and techniques besides communicating effectively in graphical form.

CO2 Analyze finishings, shoring, scaffolding and form work using various tools and techniques and through continuous learning considering safety, environment and sustainability.

CO3 Analyze organization and resource management through various tools and techniques in accordance with legislative laws and amendments in construction practice ensuring safety and sustainability.

CO4 Develop charts and event networks using appropriate tools and techniques for solving complex construction project management problems besides communicating effectively in graphical form.

CO5 Develop event networks for analyzing critical path by using CPM and PERT techniques and interpret various parameters for effective project management besides communicating effectively in graphical form.

DETAILED SYLLABUS

UNIT – I: MASONRY, FOUNDATIONSANDBUILDING COMPONENTS   (08 Periods)

Masonry and Foundations: Types of masonry, English and Flemish bonds, Rubble and ashlar masonry, Cavity walls, Partition walls, Foundations, Shallow foundations, Spread, Combined, Strap and mat footings.

Building Components: Lintels, Arches, Vaults, Stair cases, Different types of floors, Concrete, Mosaic, Terrazzo floors, Pitched, Flat and curved roofs, Lean–to–Roof, Coupled roofs, Trussed roofs, King and Queen post trusses, RCC Roofs, Madras Terrace/Shell Roofs.

UNIT - II: FINISHINGS, SHORING, SCAFFOLDING AND FORM WORK (07 Periods)

Finishings: Damp proofing , Water proofing, Termite proofing, Fire proof materials used, Plastering, Pointing, White washing and distempering, Painting, Constituents of a paint, Types of paints, Painting of new/old wood, Varnish.

Shoring, Scaffolding and Form Work: Types, Erection methodology, Latest equipment, Safety precautions.

UNIT - III: ORGANIZATION AND RESOURCE MANAGEMENT   (10 Periods)

Organization: Types, Merits and demerits of different types of organization, Labour legislation in India, Workmen's compensation act of 1923 and minimum wages act of 1948, and subsequent amendments, Safety in construction.

Resource Management: Manpower: Resource smoothing, Resource leveling, establishing workers productivity. **Materials:** Objectives of material management, Costs, Functions of material management departments, ABC classification of materials, Inventory of materials, Material procurement, Stores management. **Machinery:** (Basics only) Classification of construction equipment, Earth moving Equipment, Excavation equipment, Hauling equipment, Earth compaction equipment, Hoisting equipment, Concreting plant and equipment, Selection of equipment, Task consideration, Cost consideration, Factors affecting the selection, Factors affecting cost owning and operating the equipment, Equipment maintenance.

UNIT - IV: PROJECT MANAGEMENT AND NETWORK DEVELOPMENT   (11 Periods)

Project Management: Project planning, Scheduling, Controlling, Role of decision in project management, Techniques for analyzing alternatives, Operation research, Methods of planning and programming problems, Development of bar chart - Illustrative examples, Shortcomings of bar charts and remedial measures; Milestone charts, Development of PERT network problems.

Network Development: Introduction, Event, Activity, Dummy, Graphical guidelines for network, Common partial situations in network, Numbering the events, Cycles problems, Planning for network construction, Modes of network construction, Steps in development of network, Work breakdown structure, Hierarchies, Illustrative examples.

UNIT – V: PERT AND CPM   (09 Periods)

Network analyses, PERT, Slack, Critical path, Illustrative examples, Probability of meeting scheduled date problems, CPM process, CPM networks, Activity time estimate, Earliest event time, Latest allowable occurrence time, Combined tabular computations for T_E and T_L, Start and finish times of activity, Float, Critical activities and critical path, Resource allocation, leveling, Crashing, Illustrative examples.

Total Periods: *45*

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. K. K. Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., 2014.
2. B. C. Punmia, K. K. Khandelwal, *Project Planning and Control with PERT and CPM,* 4th Edition, Lakshmi Publications (P). Ltd., 2010.

REFERENCE BOOKS:

1. Jha, *Construction Project Management,* 1st Edition, Pearson Publications, 2011.
2. R. Chudly, Roger Greno, Mike Hurst and Simon Topliss, *Construction Technology – Vol. I and Vol. II,* 5th Edition, Longman, 2011.
3. S. Seetharaman, *Construction Engineering and Management,* 3rd Edition, Umesh Publications, 2010.
4. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Building Construction,* 10th Edition, Laxmi Publications (P) Ltd., 2010.

ADDITIONAL LEARNING RESOURCES:

1. Srinath L. S., *PERT and CPM –Principles and Applications*, 3rd Edition, Affiliated East-West Press Pvt Ltd., New Delhi, 2001.
2. Chris Hendrickson and Tung Au, *Project Management for Construction – Fundamentals Concepts for Owners, Engineers, Architects and Builders*, Prentice Hall, Pitsburgh, 2008.

(19BT30102) **FLUID MECHANICS**

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

PRE - REQUISITES: Applied Physics

COURSE DESCRIPTION: Fluid properties and fluid statics; Fluid kinematics; Fluid dynamics; Closed conduit flow and flow measurement; Laminar and turbulent flows; Hydraulic similitude and model analysis.

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

CO1 Analyze fluid properties and fluid statics to solve complex problems using appropriate techniques.

CO2 Analyze fluid flows and forces in fluid kinematics and dynamics using appropriate techniques for solving complex fluid flow problems

CO3 Analyze conduit flow and its measurement to solve complex fluid flow problems using appropriate tools and techniques following latest developments.

CO4 Design pipes and piping systems to solve complex conduit flow problems suing appropriate techniques.

CO5 Analyze laminar and turbulent flows to solve complex fluid flow problems using appropriate techniques.

CO6 Analyze problems associated with hydraulic similitude and model studies to solve complex fluid mechanics problems using appropriate techniques.

DETAILED SYLLABUS:

UNIT – I: FLUID PROPERTIES AND FLUID STATICS   (09 periods)

Dimensions and units, Physical properties of fluids, Pressure at a point, Pascal's law, Hydrostatic law; Atmospheric, gauge and absolute pressures; Measurement of pressure, Manometers, Hydrostatic forces on submerged plane and curved surfaces – Centre of pressure on plane and curved surfaces, Buoyancy, Centre of Buoyancy, Stability of floating bodies.

UNIT - II: FLUID KINEMATICS AND DYNAMICS   (09 periods)

Fluid Kinematics: Description of fluid flow, Stream line, Path line and streak line, Stream tube, Classification of flows, Equation of continuity, Stream and velocity potential functions, Flownet and its uses.

Fluid Dynamics: Surface and body forces, Euler's Equation, Bernoulli's equation for flow along a stream line and its applications, Vortex flows, Momentum equation and its application, Forces on pipe bend, Moment of momentum equation and its application, Torque on Sprinklers.

UNIT - III: CLOSED CONDUIT FLOW AND FLOW MEASUREMENT   (08 periods)

Laws of fluid friction, Major loss, Darcy–Weisbach equation, Minor losses, Pipes in series, Pipes in parallel, Total energy line and hydraulic gradient line, Venturimeter, Orificemeter, Pitot tube, Orifices and mouthpieces, Notches and weirs, Latest flow measuring devices.

UNIT - IV: LAMINAR AND TURBULENT FLOW   (09 periods)

Reynolds's experiment, Characteristics of laminar and turbulent flows, Laminar flow through circular pipes, Hagen Poiseuille equation, Flow between parallel plates, Hydro dynamically smooth and rough boundaries, Moody's chart.

UNIT - V: HYDRAULIC SIMILITUDE AND MODEL ANALYSIS   (10 periods)

Dimensional analysis, Rayleigh's method and Buckingham's pi theorem, Model studies, Similarities - Geometric, kinematic and dynamic similarities; Dimensionless numbers, Model laws, Types of model, Distorted and undistorted model, Resistance on floating and submerged bodies.

                                                                    Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS

1. R. K. Rajput, *A Textbook of Fluid Mechanics*, S. Chand Publishers, 5th Edition, 2013.
2. R. K. Bansal, *Fluid Mechanics and Hydraulic Machines*, Laxmi Publishers, 9th Edition, 2011.

REFERENCE BOOKS

1. P. N. Modi and S. M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulic Machines*, Standard Book House, 20th Edition, 2011.
2. J. F. Douglas, J.M. Gaserek and J.A. Swaffirld, *Fluid Mechanics,* 5th Edition, Longman, 2010.
3. S. K. Som and G. Biswas, *Introduction to Fluid Machines*, Tata McGraw–Hill Publishers Pvt. Ltd, 2nd Edition, 2010.
4. Domkundwar and Domkundwar, *A Textbook of Fluid Mechanics and Hydraulic Machines*, Dhanpat Rai and Co, 6th Edition, 2014.

ADDITIONAL LEARNING RESOURCES

1. Streeter, V. L., Wylie, E. B. and Bedford, K. W., *Fluid Mechanics*, McGraw Hill Book Company, New York, 9th Edition, Indian Edition, 2017.
2. Frank M White, *Fluid Mechanics,* McGraw Hill, 8th Edition, 2016.
3. S. Mukhopadhyay, *Textbook of Fluid Mechanics,* CBS Publishers, 1st Edition, 2014.

II B.Tech. – I Semester
(19BT30103) **MECHANICS OF SOLIDS**

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

PRE-REQUISITES: Course on Engineering Mechanics

COURSE DESCRIPTION: Shear force and bending moment; Stresses in beams; Combined direct and bending stresses; Torsion; Springs; Principal stresses and strains; Theories of failures; Columns and struts.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Analyze shear force and bending moment distributions for determinate beams with different loadings to solve complex structural analysis problems besides communicating effectively in graphical form.
CO2. Design beams considering bending stresses, shear stress, strain energy and theories of failures to solve complex problems ensuring safety besides communicating effectively in graphical form.
CO3. Analyze direct and bending stresses for columns and chimneys ensuring safety besides communicating effectively in graphical form.
CO4. Design shafts and springs to solve complex problems ensuring safety.
CO5. Analyze principal stresses and strains for bars and beams ensuring safety besides communicating effectively in graphical form.
CO6. Analyze columns and struts for critical loads using appropriate methods ensuring safety.

DETAILED SYLLABUS:
UNIT – I: SHEAR FORCE AND BENDING MOMENT   (09 Periods)
Types of beams, Supports and loads, Concept of shear force and bending moment, SF and BM diagrams - Cantilever, Simply supported, Overhanging beams subjected to point loads, Uniformly distributed load, Uniformly varying load and its combination, Point of contraflexure, Relation between SF and BM, Rate of loading at a section of beam.

UNIT – II: STRESSES IN BEAMS, DIRECT AND BENDING STRESSES (09 Periods)
Stresses in Beams: Theory of simple bending, Basic bending equation, Neutral axis, Bending stresses, Section modulus of different cross sections, Design of simple beam sections, Strain energy due to bending, Basic shear stress equation, Shear stress distribution for different cross sections, Strain energy due to shear.

Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, Core of a section, Stresses in chimneys, Conditions for stability, Stresses due to direct loading and bending moment about both axes.

UNIT – III: TORSION AND SPRINGS   (09 Periods)
Torsion: Theory of pure torsion, Torsional equation, Torsional moment of resistance, Polar section modulus, Power transmitted by shafts; combined bending, torsion and end thrust; Design of shafts.

Springs: Deflection of close and open coiled helical springs under axial load and axial twist, Springs in series and parallel.

UNIT – IV: PRINCIPAL STRESSES AND STRAINS & THEORIES OF FAILURE

(10 Periods)

Principal Stresses and Strains: Stresses on an inclined plane under axial loading, Compound stresses, Normal and tangential stresses on an inclined plane for biaxial stresses, Two perpendicular normal stresses accompanied by a state of simple shear, Mohr's circle of stresses, Triaxial state of stresses, Principal stresses and strains.

Theories of Failure: Maximum principal stress theory, Maximum principal strain theory, Maximum shear stress theory, Maximum strain energy theory, Maximum shear strain energy theory.

UNIT – V: COLUMNS AND STRUTS   **(08 Periods)**

Short, medium and long columns, Axially loaded compression members, Euler's theorem for long columns, Euler's critical load, Equivalent length of a column, Slenderness ratio, Limitations of Euler's theory, Rankine–Gordon formula, Long columns subjected to eccentric loading.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications Pvt. Ltd., 2001.

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

REFERENCES:

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

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

3. 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.

4. Khurmi, R. S., Strength of Materials, S. Chand & Company Ltd., 23rd Edition, 2005.

ADDITIONAL LEARNING RESOURCES:

1. T. D. Gunneswara Rao and Mudimby Andal, *"Strength of Materials: Fundamentals and Applications*, Cambridge University Press, 1st Edition, 2018.

2. Bansal, R. L., *Strength of Materials*, Laxmi Publications (P) Ltd., 4th Revised Edition, 2010.

3. Stephen H. Crandall, Norman C. Dahi, Thomas J. Lardner and Sivakumar M. S., *An Introduction to the Mechanics of Solids*, Tata McGraw-Hill Education Pvt. Ltd., 2nd Revised Edition, 2012.

4. S. Timoshenko., *Strength of Materials*, CBS Publishers & Distributors Pvt. Ltd., Revised 3rd Edition, Special Indian Edition, 2004.

5. Ryder, G. H., *Strength of Materials,* Macmillan Publishers India Limited, 3rd Edition, Special Indian Edition, 2002.

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

II B.Tech. – I Semester
(19BT30104) **SURVEYING**

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

PRE-REQUISITES: Courses on Numerical Methods, Probability and Statistics; Applied Physics.

COURSE DESCRIPTION: Chain surveying; Compass surveying; Plane tabling; Levelling and contouring; Theodolite surveying; Tacheometric surveying; Computation of areas and volumes; Curves; Electronic distance measurement; Drone surveying.

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

CO1 Analyze chain, compass and plane table surveying techniques for measuring distances, horizontal angles and preparing plans to solve complex surveying problems following ethics and considering society, environment and sustainability besides communicating effectively in graphical form.

CO2 Analyze leveling and contouring techniques for finding elevations to solve complex surveying problems following ethics and considering society besides communicating effectively in graphical form.

CO3 Analyze theodolite and tacheometric surveying techniques for finding distances, angles and elevations to solve complex surveying problems following ethics and considering society besides communicating effectively in graphical form.

CO4 Compute areas and volumes to solve complex surveying problems associated with civil engineering applications using appropriate techniques following ethics and considering society besides communicating effectively in graphical form.

CO5 Design different types of curves to solve transportation engineering problems using appropriate techniques following ethics and considering society besides communicating effectively in graphical form.

CO6 Analyze EDM and drone surveying techniques for various applications following ethics and latest developments considering society besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT - I: CHAIN AND COMPASS SURVEYING   (10 Periods)

Chain Surveying: Classification of surveying, Objectives, Principles of surveying; Influence of surveying on society, environment and sustainability; Distance measurement, Accuracy and errors, Chain and its types, Optical square, Cross staff, Reconnaissance and site location, Locating ground features by offsets, Field book, Chaining for outline of structures, Methods for overcoming obstacles, Conventional symbols, Plotting chain survey, Computation of areas, Errors in chain surveying and their elimination.

Compass Surveying: Types of compass, Bearings, Included angles, Errors and adjustments.

UNIT - II: PLANE TABLE SURVEYING, LEVELING AND CONTOURING (09 Periods)

Plane Table Surveying: Equipment, Methods of plane tabling, Errors, Two and three point problems.

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Leveling and Contouring: Types of leveling, Types of leveling instruments, Temporary and permanent adjustments, Height of instrument and rise and fall methods, Plotting longitudinal sections and cross sections, Effect of curvature and refraction, Characteristics of contours, Uses of contour maps.

UNIT - III: THEODOLITE AND TACHEOMETRIC SURVEYING   (08 Periods)

Theodolite Surveying: Description of theodolite, Temporary and permanent adjustments of vernier transit, Measurement of horizontal and vertical angles, Heights and distances, Traversing, Closing error and distribution, Gale's traverse table, Omitted measurements.

Tacheometric Surveying: Principle of stadia method, Distance and elevation formulae for staff held vertical and normal, Instrumental constants, Anallactic lens, Tangential method.

UNIT - IV: COMPUTATION OF AREAS AND VOLUMES, AND CURVES   (09 Periods)

Computation of Areas: Areas dividing into number of triangles, By offsets to a base line, By coordinates, Areas from maps.

Computation of Volumes: Volume from cross-section, Embankments and cutting for a level section and two level sections with and without transverse slopes, Determination of the capacity of reservoir.

Curves: Different types and their characteristics, Setting out, Design of curves by Rankine's and offset methods - Circular, Transition, Combined and vertical curve.

UNIT - V: ELECTRONIC DISTANCE MEASUREMENT (EDM) AND DRONE SURVEYING   (09 Periods)

EDM: EDM Principle, Modern electronic surveying equipment – Digital levels, Digital theodolites, Total station; Total station – Working principle, Applications: Measurement of distance, Area, Height, Angles, Gradients, Traversing, Contouring, Stake out, Data analysis; Latest developments in EDM survey techniques.

Drone Surveying: Working principle, Benefits of drones in surveying, Applications, Interior and exterior drone surveying, Calculation of length, area and stockpile volume.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Surveying – Vol. I, II and III*, Laxmi Publications (P) Ltd., 17th Edition, 2016.
2. R. Subramanian, *Surveying and Leveling,* Oxford University Press, 2nd Edition, 2012.

REFERENCE BOOKS:

1. S. K. Duggal, *Surveying – Vol. I and II*, Tata McGraw–Hill Publishing Co. Ltd., 4th Edition, 2013.
2. Arthur R. Benton and Philip J. Taetz, *Elements of Plane Surveying,* McGraw-Hill, 3rd Edition, 2010.
3. Arora, K. R., *Surveying – Vol. I and II,* Standard Book House, 14th Edition, 2011.
4. T. P. Kanetkar and S. V. Kulakarni, *Surveying and Leveling*, Pune Vidyarthi Griha Prakashan, Pune, 24th Edition, 2013.

ADDITIONAL LEARNING RESOURCES:

1. C. Venkatramaih, *Textbook of Surveying*, Universities Press (India) Limited, Hyderabad, 2nd Edition, 2011.

2. Jerry A. Nathanson, Michael T. Lanzafama and Philip Kissam, *Surveying Fundamentals and Practices*, Pearson Publications, 7th Edition, 2017.

(19BT3HS31) SOFT SKILLS LAB
(Common to CE, ME, EEE, ECE and EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.

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

CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.

CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.

CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

*First TEN exercises are mandatory among the following:

List of Exercises:

1. Body Language

  Types of Body Language – Parts of Body – Facial Expressions – Eye Contact Insights – Good Posture

2. Assertiveness

  Communications Styles – Benefits – Being Unassertive – Role Playing

3. Goal Setting

  Seven Steps of Goal Setting – Self Motivation – Personal Goal Setting – Setting Career Goals

4. Thinking Skills

  Positive Thinking – Creative Thinking – Lateral Thinking – Logical Thinking – Intitutive Thinking

5. Team Building

  Learning Activities – Management Essentials – Team Building Scenarios

6. Conflict Management

  Ways of Resolving Conflict – Personality Types and Conflict – Conflict Resolution Process – Team Conflict

7. Technical Report Writing

  Objectives – Formats – Writing Styles

8. Résumé Writing

  Structure and Presentation – Planning – Defining Career Objectives – Projecting One's Strengths and Skills – Cover Letter – Formats and Styles

9. Group Discussions
   Types of GD – Dos and Don'ts – Dynamics of GD – Intervention – Summarization Techniques
10. Interview Skills
   Planning – Opening Strategies – Answering Strategies – Tele Conferencing – Video Conferencing
11. Interpersonal Skills
   Starting a Conversation – Responding to a Conversation – Conversation Examples – Body Language – Role Play
12. Etiquette
   Basic Social Etiquette – Telephone Etiquette – Dinning Etiquette – Conference Etiquette

TEXT BOOKS

1. Soft Skills Lab Manual, SVEC.

REFERENCE BOOKS:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, 3rd edition, New Delhi, 2012.

SUGGESTED SOFTWARES:

1. KVAN SOLUTIONS

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

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

4. Language in Use 1, 2 & 3.

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

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

ADDITIONAL LEARNING RESOURCES

1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html

2. http://job-search-search.com/interviewing/behavioral_interviews

3. https://goo.gl/laEHOY **(dealing with complaints)**

4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html

5. https://goo.gl/FEMGXS

II B.Tech. – I Semester

(19BT30131) CIVIL ENGINEERING MATERIALS AND CONSTRUCTION TECHNOLOGY WORKSHOP

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

PRE-REQUISITES: Course on Civil Engineering Materials and Construction Technology.

COURSE DESCRIPTION: Experiments/Exercises on Civil Engineering Materials, Construction Equipment, Masonry, Bar bending, Reinforcement, Painting, House wiring, Shuttering and Scaffolding; Tests on Cement, Fine aggregates, Fresh and hardened concrete; Elasticity; NDT; Mix design - IS method.

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

CO1 Evaluate civil engineering materials using various tools/techniques to solve complex civil engineering material problems by following relevant IS codes and latest developments ensuring cost effectiveness, safety, environment and sustainability.

CO2 Analyze various construction techniques to solve complex construction technology problems by following current developments ensuring cost effectiveness, safety, environment and sustainability.

CO3 Design the concrete mix using IS-10262.

CO4 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

LIST OF EXPERIMENTS/EXERCISES:

Part – I: CIVIL ENGINEERING MATERIALS

A. PROPERTIES AND IDENTIFICATION OF CIVIL ENGINEERING MATERIALS

1. Properties and identification of building materials
2. Market survey for building materials

B. TESTS ON BRICK

3. Visual inspection test for color, shape and size
4. Soundness of brick
5. Water absorption test of brick
6. Efflorescence test of brick
7. Compressive strength of brick

C. TESTS ON CEMENT

8. Fineness of cement by dry sieving
9. Standard consistency of cement
10. Initial and Final setting time of cement
11. Soundness of cement
12. Specific gravity of cement
13. Compressive strength test on cement

D. TESTS ON FINE AGGREGATE
14. Sieve Analysis of Fine aggregate
15. Specific gravity of Fine aggregate
16. Bulking of Fine aggregate

E. CONCRETE MIX DESIGN – IS Method

F. TESTS ON FRESH CONCRETE
17. Slump cone test
18. Compaction factor test
19. Vee-Bee consistometer test

G. TESTS ON HARDENED CONCRETE
20. Compressive strength test of concrete
21. Split tensile strength test of concrete
22. Flexural strength test of concrete
23. Modulus of elasticity of concrete

H. NON-DESTRUCTIVE TESTS ON HARDENED CONCRETE
24. Rebound hammer test
25. PUNDIT

PART- II: CONSTRUCTION TECHNOLOGY
A. INDENTIFICATION OF CONSTRUCTION EQUIPMENT
1. Specifications and identification of construction equipment
2. Market survey for construction equipment

B.MASONRY
3. Construction of masonry brick wall using English bond
4. Construction of masonry brick wall using Flemish bond

C. BAR BENDING AND REINFORCEMENT
5. Bar bending of reinforcement skeleton for foundations, columns, beams, slabs, lintels, arches, vaults and stair cases.

D. PAINTING
6. External wall painting
7. Internal wall painting

F. HOUSE WIRING
8. 16 A Line
9. 6 A Line

G. SHUTTERING AND SCAFFOLDING
10. Shuttering for beams and slabs
11. Shuttering for columns and Walls
12. Steel scaffolding
13. Single and double scaffolding

Note: A minimum of Fourteen Experiments/Exercises from Part-I and all Experiments/Exercises from Part – II shall be conducted.

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Civil Engineering Materials and Construction Technology Workshop Manual (SVEC19 Regulations),* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.
2. S. K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010.
3. A. M. Neville, *Properties of Concrete*, John Wiley and Sons, New Delhi, 5th Edition, 2012.

IS Codes:

1. IS 1077 – 1992   : Brunt Clay Building Brick.
2. IS 4031 - 1988   : Chemical Analysis and Tests on Cement.
3. IS 383 - 1970   : Coarse and Fine Aggregates.
4. IS 10264 - 2009   : Mix Design of Concrete.
5. IS 1199 - 1959   : Methods of Sampling and Analysis of Concrete.
6. IS 13311- 1992   : Method of Non-destructive Testing of Concrete.
7. IS 7293 - 1974   : Safety Code for Working with Construction Machinery.
8. IS 2212 - 1991   : Code of Practice for Brick Work.
9. IS 2502 – 1993   : Code of Practice for Bar Bending And Fixing Of Bars.
10. IS 2395(1) - 1994   : Code of Practice for Painting Concrete, Masonry.
11. IS 732 – 1989   : Code of Practice for Electrical Wiring Installations.
12. IS 14678 - 1999   : Guidelines for Falsework for Concrete Structures

II B. Tech. – I Semester
(19BT30132) **STRENGTH OF MATERIALS LAB**
(Common to CE and ME)

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

PRE-REQUISITES: Course on Mechanics of Solids/Strength of Materials.

COURSE DESCRIPTION: Tests on strength of materials**:** Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Verification of Maxwell reciprocal theorem.

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

CO1. Evaluate the strength of materials such as steel, timber, metal using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.

CO2. Evaluate the load-deflection behavior for the materials used in beams and springs using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.

CO3. Perform material testing individually or in a team besides communicating effectively in written, oral and graphical forms on strength of materials.

LIST OF EXPERIMENTS:

1. Tension test on mild steel/HYSD bar
2. Compression test on wood/bricks/mild steel
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Bending test on overhanging beam
14. Verification of Maxwell's reciprocal theorem
15. Torsion test on mild steel

Note: Minimum 12 experiments shall be conducted.

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Strength of Materials Lab Manual (SVEC19 Regulations),* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

II B. Tech. – I Semester
(19BT30133) **SURVEYING LAB**

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

PRE-REQUISITES: Course on Surveying

COURSE DESCRIPTION: Exercises on Chain surveying; Compass surveying; Plane table surveying; Auto Levelling; Theodolite surveying; Total station surveying; Drone surveying.

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

CO1 Develop survey plots using chain, compass, plane table, theodolite, total station and drone surveying techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.

CO2 Develop contour maps using auto level, total station and drone surveying techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.

CO3 Design simple curves to solve transportation engineering problems using appropriate techniques following ethics and considering society.

CO4 Analyze survey plots for areas using planimeter tool to solve complex surveying problems following ethics and considering society.

CO5 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on surveying practice.

LIST OF PRACTICAL EXERCISES:

A) CHAIN SURVEY
1. Cross staff survey and plotting
2. Chain traversing and plotting

G) COMPASS SURVEY
3. Determination of area by radiation method and plotting
4. Compass traversing and plotting

H) PLANE TABLE SURVEY
5. Resection – Two point and three point problems

I) LEVELLING
6. Longitudinal and cross–sectioning of a road profile and plotting
7. Contour plan of given area

J) THEODOLITE SURVEY
8. Measurement of horizontal angles by method of repetition and reiteration
9. Trigonometric leveling – Measurement of heights and distances
10. Setting out a simple curves by Rankine's method of tangential angles
11. Setting out works for buildings and pipe lines (demonstration only)

K) TOTAL STATION SURVEY

12. Determination of area using total station
13. Determination of remote height using total station
14. Distance, gradient, and differential height between two inaccessible points using total station
15. Stake-out using total station (demonstration only)
16. Traversing using total station (demonstration only)
17. Contouring using total station (demonstration only)

G) AREA BY PLANIMETER

18. Determination of area of irregular figure by using planimeter (demonstration only)

H) DRONE SURVEY

19. Determination of length and area using drone survey (demonstration only)
20. Route mapping using drone survey (demonstration only)
21. Contouring using drone survey (demonstration only)

NOTE:

Minimum 12 experiments shall be conducted excluding demonstration experiments.

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Surveying Laboratory Manual (SVEC19 Regulations),* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

(19BT315AC) **DESIGN THINKING**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: -

COURSE DESCRIPTION:

Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.

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

CO1   Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.

CO2   Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

CO3   Develop innovative products or services for a customer base using ideation techniques.

CO4   Build prototypes for complex problems using gathered user requirements.

CO5   Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.

CO6   Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DESIGN THINKING   (6 Periods)

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

UNIT - II: EMPATHIZE

(6 Periods)

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

UNIT - III: IDEATION

(6 Periods)

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

UNIT - IV: PROTOTYPING (6 Periods)

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype

UNIT - V: TESTING PROTOTYPES (6 Periods)

Prototyping for digital products: What's unique for digital, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

Total Periods: 30

Topics for Self-Study are provided in Lesson Plan

TEXTBOOKS:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly, 2017.

REFERENCE BOOKS

1. Michael G. Luchs, Scott Swan , Abbie Griffin,"Design Thinking – New Product Essentials from PDMA", Wiley, 2015.
2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we
4. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
5. https://nptel.ac.in/courses/109/104/109104109/
6. https://nptel.ac.in/courses/110106124/

(19BT40101) ENGINEERING HYDROLOGY

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	–	3

PRE-REQUISITES: Course on Fluid Mechanics

COURSE DESCRIPTION: Hydrologic cycle; Applications and history; Weather and seasons in India; Precipitation; Evaporation; Evapotranspiration; Runoff; Streamflow; Groundwater hydrology; Hydrograph analysis; Design flood; Erosion; Reservoir sedimentation.

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

CO1 Analyze hydrologic cycle and precipitation to solve complex hydrology problems using appropriate techniques considering environment and sustainability besides communicating effectively in graphical form.

CO2 Analyze abstractions from Precipitation and runoff using appropriate tools and techniques for solving complex hydrology problems considering safety, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze groundwater hydrology to solve complex problems using appropriate tools and techniques following latest developments and considering safety, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze hydrographs using appropriate techniques to solve complex hydrology problems considering environment and sustainability besides communicating effectively in graphical form.

CO5 Design floods using appropriate techniques to solve flood routing problems following ethics and considering safety, environment and sustainability besides communicating effectively in graphical form.

CO6 Analyze erosion and reservoir sedimentation to solve complex problems using appropriate techniques and considering safety, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT- I: HYDROLOGY AND PRECIPITATION   (09 Periods)

Scope of hydrology, Hydrologic cycle, Practical applications and historical development; *Precipitation*-Types and forms, Weather and seasons in India, Measurement of rainfall; Recording and non-recording rain gauges, Errors, Analysis and interpretation of rainfall data, Methods of calculation of mean precipitation over an area.

UNIT -II: ABSTRACTIONS FROM PRECIPITATION AND RUNOFF   (09 Periods)

Abstractions from Precipitation: Process, Factors, Estimation, Methods of reduction of evaporation, Evapotranspiration - Factors, Measurement, Estimation, Penman Monteith method; Infiltration – Process, Factors, Double ring infiltrometer, Infiltration equation and indices, Interception, Horton's equation and Green Ampt method.

Runoff: Components, Factors, Rainfall–runoff relationships, Flow mass curve, Flow duration curve, Mass curve of rainfall, Hyetograph, Double mass curve; Streamflow - Concept, Measurement, Stage, Discharge - Area velocity method, Moving boat method.

UNIT - III: GROUNDWATER HYDROLOGY   (09 Periods)

Occurrence and movement of groundwater, Darcy's law and its application, Types and properties of aquifers, Conjunctive use and it's necessity; Confined and unconfined flow equations; Well hydraulics - Steady and unsteady flow, Well losses, Specific capacity, Pumping and recuperation test; Pollution of groundwater - Sources, Seawater intrusion; Artificial recharge techniques, Groundwater exploration – Methods, Latest developments.

UNIT - IV: HYDROGRAPH ANALYSIS AND DESIGN FLOOD   (10 Periods)

Components of hydrograph, Unit hydrograph, Derivation, Use and limitation of unit hydrograph, Design flood – Estimation of peak discharge, Methods - Envelope curves, Empirical formulae, Rational method, Unit hydrograph method, S-Curve unit hydrograph, Frequency analysis, Gumbel's and log Pearson Type III methods; Flood routing – Concepts of flow routing, hydraulic and hydrologic routing, Reservoir routing, Channel routing, Muskingum's method.

UNIT - V: EROSION AND RESERVOIR SEDIMENTATION   (08 Periods)

Erosion process, Estimation of sheet erosion, Channel erosion, Movement of sediment from watersheds, Sediment yield from watersheds, Trap efficiency, Density of sediment deposits, Distribution of sediment in reservoir, Life of a reservoir, Reservoir sedimentation control, Erosion and reservoir sedimentation problems in India.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. K. Subramanya, *Engineering Hydrology*, Tata McGraw–Hill Education Pvt. Ltd., 4th Edition, 2013.
2. P. Jaya Rami Reddy, *A Text Book of Hydrology,* University Science Press, An Imprint of Laxmi Publications Pvt. Ltd., 3rd Edition, 2011.

REFERENCE BOOKS:

1. H. M. Raghunath, *Ground Water,* Wiley Eastern Ltd., 3rd Edition, 2009.
2. David Keith Todd, *Groundwater Hydrology,* Wiley India Pvt. Ltd., 2nd Edition, 2010.
3. V. T. Chow., *Hand Book of Applied Hydrology,* Mc Graw–Hill Education Pvt. Ltd., 2nd Edition, 2000.
4. C. S. P. Ojah, R. Berndtsson, P. Bhunya, *Engineering Hydrology,* Oxford Higher Education, 5th Edition, 2008.

ADDITIONAL LEARNING RESOURCES

1. V. P. Singh, *Handbook of Applied Hydrology*, McGraw Hill Education, 2nd Edition, 2016.
2. Santosh Kumar Garg, *Water Resources Engineering (Vol. I): Hydrology, Flood Control and Groundwater Engineering,* Khanna Publishers, Delhi, 25th Revised Edition, 1973.
3. Murthy, V. V. N. and Madan Kumar Jha, *Land and Water Management Engineering*, Khalyani Publishers, New Delhi, 5th Edition, 2013.
4. **Ray K. Linsley, Max Adam Kohler and Joseph L. H.,** *Hydrology for Engineers*, McGraw-Hill Series in Water Resources and Environmental Engineering, McGraw-Hill Education, 3rd Edition, SI Metric Edition, 1988.

(19BT40102) **ENVIRONMENTAL ENGINEERING**

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

PREREQUISITES: Environmental Science

COURSE DESCRIPTION: Water Sources, Quality and Quantity, Intakes; Water Treatment and Distribution Systems; Sewage Characteristics, Collection and Quantity; Sewage Treatment; Sewage Effluent, Sludge Treatment and Disposal.

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

CO1   Analyze water sources, quality and quantity using different tools and techniques for solving water supply problems considering codes of practice, public health and safety, environment and sustainability.

CO2   Design water treatment and distribution systems using different methods to solve water supply problems by following current developments and considering codes of practice, public health and safety, environment and sustainability besides communicating graphically.

CO3   Design sewage collection systems for treatment and disposal to solve complex problems considering appropriate methods, code of practices, public health and safety, environment and sustainability.

CO4   Design sewage treatment and sludge digestion units to solve complex problems by following latest developments and considering code of practices, public health and safety, environment and sustainability besides communicating graphically.

CO5   Analyze sewage effluent, sludge treatment and disposal, house drainage plumbing systems in buildings using different tools and techniques considering codes of practice, health and safety, environment and sustainability besides communicating graphically.

DETAILED SYLLABUS:

UNIT - I: WATER SOURCES, QUALITY AND QUANTITY, INTAKES   (06 Periods)

Water Sources – Types, Quality, Quantity, Drinking water quality analysis and standards; Protected water supply – Need, Objectives; Population forecasting – Methods, Design period; Water demand – Types, Per capita demand, Factors affecting, Fluctuations; Intakes – Types, Factors influencing site selection.

UNIT - II: WATER TREATMENT AND SUPPLY   (12 Periods)

Water Treatment: Units, Functions, Processes – Aeration, Coagulation, Flocculation, Optimum Coagulant Dosage; Sedimentation – Types, Factors affecting, Design of sedimentation tank; Filtration – Types; Slow and Rapid Gravity Sand Filters - Design, Operation and Maintenance; Disinfection – Methods, Chlorination, Chlorine demand, Break point chlorination; Latest techniques in water treatment.

Water Supply: Systems and methods; Distribution systems – Layouts, Design by Hardy Cross and equivalent pipe methods; Water supply arrangements in buildings - Flow meters, Pipe appurtenances, Laying and testing of pipe lines, Leakage prevention, Repair and maintenance.

UNIT – III: SEWAGE CHARACTERISTICS, COLLECTION AND QUANTITY

(06 Periods)

Sewage characteristics - Physical, Chemical and Biological; Sewage collection systems – Types, Comparison; Estimation of sanitary sewage and storm water runoff, Hydraulic design of sewers, Sewer appurtenances, BOD Equations and Self purification of streams.

UNIT – IV: SEWAGE TREATMENT   **(12 Periods)**

Layout of sewage treatment plant; Design of primary treatment units - Screen chamber, Grit chamber, Sedimentation tank; Design of secondary treatment units – Attached growth systems - Trickling filters, Rotating Biological Contactors, Bio-towers; Suspended growth systems - Activated Sludge process, Oxidation ditch, Stabilisation pond; Design of sludge digestion tank – Aerobic and anaerobic, Factors influencing the digestion process; Latest techniques in sewage treatment.

UNIT – V: SEWAGE EFFLUENT, SLUDGE TREATMENT AND DISPOSAL **(9 Periods)**

Disposal of sewage effluent – Dilution, Sewage farming, ISI Effluent disposal standards; Design of septic tank, Soak pit, Dispersion trench; Sludge treatment and disposal, House drainage plumbing systems in buildings.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. G. S. Birdie and J. S. Birdie, *Water Supply and Sanitary Engineering*, Dhanpat Rai and Sons Publishers, 9th Edition, 2011.
2. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.

REFERENCE BOOKS:

1. S. K. Garg, *Environmental Engineering, (Vol. I): Water Supply Engineering*, Khanna Publishers, 20th Edition, 2011.
2. S. K. Garg, *Environmental Engineering (Vol. II): Sewage Disposal and Air Pollution Engineering*, Khanna Publishers, 27th Edition, 2013.
3. Met Calf and Eddy, *Wastewater Engineering*, TMH Education Pvt. Ltd., 4th Edition, 2010.
4. R. Elangovan and M.K Saseetharan, *Unit Operations in Environmental Engineering*, New Age International (P) Limited, 1st Edition, 2008.

ADDITIONAL LEARNING RESOURCES:

1. S. K. Duggal, *Elements of Environmental Engineering,* S. Chand Publishing, 3rd Edition, 2013.
2. P. N. Modi, *Water Supply Engineering (Environmental Engineering-I)*, Standard Book House, 6th Edition, 2018.
3. P.N. Modi, *Sewage Treatment Disposal and Wastewater Engineering (Environmental Engineering-II)*, Standard Publishers Distributors, 17th Edition, 2019.
4. B.C. Punmia, Ashok K. Jain and Arun K. Jain, *Environmental Engineering-II: Wastewater Engineering (Including Air Pollution),* Laxmi Publications, 2nd Edition, 2019.

II B. Tech. – II Semester
(19BT40103) **HYDRAULIC ENGINEERING**

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

PRE-REQUISITES: Course on Fluid Mechanics

COURSE DESCRIPTION: Boundary layer theory; Open channel flow; Impact of jet on vanes; Hydraulic turbines; Pumps.

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

CO1   Analyze boundary layer problems to solve complex hydraulic engineering problems using appropriate techniques besides communicating effectively in graphical form..

CO2   Design open channels using appropriate tools and techniques for solving complex open channel problems considering safety, environment and sustainability besides communicating effectively in graphical form.

CO3   Analyze impact of jet on vanes to solve complex fluid flow problems using appropriate techniques considering safety besides communicating effectively in graphical form.

CO4   Design hydraulic turbines using appropriate techniques to solve hydraulic engineering problems considering safety, environment and sustainability besides communicating effectively in graphical form.

CO5   Design pumps to solve hydraulic engineering problems using appropriate techniques following latest developments and considering safety, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT - I: BOUNDARY LAYER THEORY   **(10 Periods)**

Boundary layer concepts, Thickness of boundary layer, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, Laminar and turbulent boundary layers, Laminar sub–layer, Separation of boundary layer, Control of boundary layer, Flow around submerged bodies, Drag and lift.

UNIT – II: OPEN CHANNEL FLOW   **(09 Periods)**

Types of flows, Types of channels, Velocity distribution, Chezy's, Manning's and Bazin's formulae for uniform flow, Most Economical sections, Critical flow, Specific Energy, Critical depth, Computation of critical depth, Critical, subcritical and supercritical flows, Non-uniform flow, Dynamic equation for gradually varied flow, Types of slopes, Surface profiles, Rapidly varied flow, Hydraulic jump and its applications, Surges.

UNIT - III: IMPACT OF JET ON VANES   **(08 Periods)**

Hydrodynamic force of jets on stationary and moving, vertical, inclined and curved vanes, Series of vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, Expressions for work done and efficiency.

UNIT - IV: HYDRAULIC TURBINES   (10 Periods)

Layout of a typical hydropower installation, Heads and efficiencies, Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine, Working and working proportions, Velocity diagrams, Work done and efficiency, Hydraulic design, Runaway speed, Draft tube theory, Function and efficiency, Governing of turbines, Surge tanks, Unit quantities and specific speed, Performance of turbines, Characteristic curves, Cavitation, Causes, Effects, Classification of hydropower plants, Load factor, Utilization factor, Capacity factor, Estimation of hydropower potential.

UNIT - V: PUMPS   (08 Periods)

Pumps - Components, Classification; Centrifugal pumps - Classification, Heads, Losses and efficiencies, Limitation of suction lift, Work done, Minimum starting speed, Specific speed; Multistage pumps, Pumps in parallel and series, Performance of pumps, Characteristic curves, Net positive suction head, Priming, Cavitation, Reciprocating pumps - Classification, Work done, Slip, Limitations; Special pumps – Self priming pump, Gear pump, Jet pump, Airlift pump; Latest developments in pumps.

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. R. K. Rajput, *A Textbook of Fluid Mechanics*, S. Chand Publishers, 5th Edition, 2013.
2. R. K. Bansal, *Fluid Mechanics and Hydraulic Machines*, Laxmi Publishers, 9th Edition, 2011.

REFERENCE BOOKS:

1. P. N. Modi and S. M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulic Machines*, Standard Book House, 20th Edition, 2011
2. Domkundwar and Domkundwar, *A Textbook of Fluid Mechanics and Hydraulic Machines*, Dhanpat Rai and Co, 6th Edition, 2014.
3. V.T .Chow, *Open Channel Flow,* 3rd Edition, McGraw–Hill Publishers, 2009.
4. K. Subramanya, Flow in Open Channels, 3rd Edition, Tata McGraw Hill Publishers, 2010.

ADDITIONAL LEARNING RESOURCES:

1. John A. Roberson, John J. Cassidy, and M. Hanif Chaudhry, *Hydraulic Engineering,* 2nd Edition, ISBN-13: 978-0471124665, Wiley, 2 Edition, 1998.
2. L. Hamill, *Understanding Hydraulics*, MacMillan Education UK, 3rd Edition, 2011.

(19BT40104) **SOIL MECHANICS**

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

PRE-REQUISITES:-Courses on Engineering Mechanics, Engineering Geology Lab.

COURSE DESCRIPTION: Basic principles of soil mechanics and their application in engineering practice; Index properties; Engineering properties - Permeability and Seepage, Stress distribution and Compaction, Consolidation, Shear strength.

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

CO1 Analyze index properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring cost effectiveness besides communicating effectively in graphical form.

CO2 Analyze permeability and seepage through soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze stress distribution and compaction characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze consolidation characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze shear strength characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and ensuring safety, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT – I: INDEX PROPERTIES OF SOILS   (09 Periods)

Soil formation, Types of soils, Soil structure and clay mineralogy, Adsorbed water, Volume–weight relationships, Three–phase diagram, Moisture content, Specific gravity, In–situ density, Relative density, Grain size analysis – Sieve and hydrometer methods, Plasticity of soils, Consistency limits and indices, I.S. Classification of soils, Sensitivity, Thixotropy, Activity of soil, Field identification of soils, Latest methods.

UNIT – II: PERMEABILITY AND SEEPAGE THROUGH SOILS   (09 Periods)

Permeability: Soil water, Capillary rise, Flow of water through soils, Darcy's law, Permeability, Factors affecting permeability, Laboratory determination of coefficient of permeability, Permeability of layered systems.

Seepage through Soils: Effective stress principle, Effective stress under different loading conditions, Seepage pressure, Quicksand condition, Seepage through soils, Flownets – Characteristics and uses; Seepage through earth dams with horizontal filter, Critical hydraulic gradient.

UNIT – III: STRESS DISTRIBUTION IN SOILS AND COMPACTION   **(09 Periods)**

Stress Distribution in Soils: Boussinesq's theory - Point loads, Line loads, Circular and rectangular loaded areas; Westergaard's theory, Newmark's influence chart, Approximate methods, Contact pressure distribution.

Compaction: Mechanism of compaction, Optimum moisture content and maximum dry density, Factors affecting compaction, Effects of compaction on soil properties, Laboratory determination of OMC and MDD, Field compaction – Methods, Latest developments; Compaction control.

UNIT – IV: CONSOLIDATION OF SOILS   **(09 Periods)**

Initial, Primary and secondary consolidation, Spring analogy for primary consolidation, Consolidation test– e–p and e–log p curves; Terzaghi's theory of one dimensional consolidation – Coefficient of consolidation; Pre-consolidation pressure, Secondary consolidation.

UNIT – V: SHEAR STRENGTH OF SOILS   **(09 Periods)**

Mohr–Coulomb failure theories, Types of laboratory shear strength tests, Strength tests based on drainage conditions and their field applicability, Shear strength of cohesionless soils, Critical void ratio, Liquefaction, Shear strength of cohesive soils, Skempton's pore pressure coefficients.

Total Periods: *45*

The topics for self–study are provided in the lesson plan.

TEXT BOOKS

1. Gopal Ranjan and A. S. R. Rao, *Basic and Applied Soil Mechanics,* New Age International Pvt. Ltd., 2nd Revised Edition, 2014.
2. K. R. Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, 7th Edition, 2014.

REFERENCE BOOKS

1. Braja M. Das, *Principles of Geotechnical Engineering,* Cengage Learning India, 7th Edition, 2009.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation,* Laxmi Publications Pvt. Ltd., 16thEdition, 2014.
3. C. Venkatramaiah, *Geotechnical Engineering,* New Age International Publishers, 3rd Edition, 2010.
4. Lambe, T. W. and Whitman, R. V., *Soil Mechanics,* John Wiley and Sons, Singapore, 2000.

ADDITIONAL LEARNING RESOURCES:

1. Richard Handy and Merlin Spangler, *Geotechnical Engineering Soil and Foundation Principles and Practice*, McGraw-Hill Education, 5th Edition, 2007.
2. Robert D. Holtz, William D. Kovacs and Thomas C. Sheahan, *An Introduction to Geotechnical Engineering*, Pearson Publication, 2nd Edition, 2011.

II B. Tech. – II Semester
(19BT40105) **STRUCTURAL ANALYSIS**

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

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids

COURSE DESCRIPTION: Deflection of beams; Energy method; Fixed beams; Clapeyron's theorem; Slope deflection method; Moment distribution method; Kani's method; Moving loads and influence lines; Plastic analysis.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1   Analyze slope and deflection of beams and pin-jointed trusses to solve complex structural analysis problems using various methods besides communicating effectively in graphical form.
CO2   Analyze fixed beams using force method to solve complex structural analysis problems besides communicating effectively in graphical form.
CO3   Analyze continuous beams using various methods to solve complex structural analysis problems besides communicating effectively in graphical form.
CO4   Analyze determinate beams using the concept of moving loads and influence lines to solve complex structural analysis problems besides communicating effectively in graphical form.
CO5   Analyze beams using plastic analysis technique to solve complex structural failures ensuring safety besides communicating effectively in graphical form.

DETAILED SYLLABUS:
UNIT – I: DEFLECTION OF BEAMS   (09 Periods)
Bending into a circular arc, Slope, deflection and radius of curvature; Differential equation for the elastic curve of a beam, Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. and uniformly varying loads; Double integration method, Macaulay's method, Moment area method, Conjugate beam method, Deflections of propped cantilevers for simple loading cases.

UNIT – II: ENERGY METHOD AND FIXED BEAMS   (09 Periods)
Energy Method: Strain in linear elastic system, Expression of strain energy due to axial load, BM and SF, Castigliano's first theorem, Deflections of simple beams and pin-jointed plane trusses.

Fixed Beams: Shear force and bending moment diagrams for fixed end moment due to - Point loads, uniformly distributed load, Uniformly varying load, Couple and combination of loads, Effect of sinking and rotation of support, Deflection of fixed beams.

UNIT – III: CLAPEYRON'S THEOREM AND SLOPE DEFLECTION METHOD
                                             (09 Periods)
Clapeyron's Theorem: Continuous beams, Clapeyron's theorem of three moments, Analysis of continuous beams with one or both ends fixed, Continuous beams with overhang, Effect of sinking of supports.

Slope–Deflection Method: Basic concepts, Slope deflection equation, Application to continuous beams with and without settlement of supports.

UNIT - IV: MOMENT DISTRIBUTION METHOD AND KANI'S METHOD (09 periods)

Moment Distribution Method: Basic concepts, Stiffness factor, Carryover, Distribution factor, Application to continuous beams with and without settlement of supports.

Kani's Method: Basic concepts, Rotation contribution, Rotation factor, Analysis of continuous beams with and without settlement of supports.

UNIT – V: MOVING LOADS, INFLUENCE LINES AND PLASTIC ANALYSIS

(09 Periods)

Moving Loads and Influence Lines: Moving loads; Influence line for support reaction, SF and BM; Load position for maximum SF and for maximum BM at a section; Loading - Point loads, UDL longer than the span, UDL shorter than the span; Equivalent uniformly distributed load.

Plastic Analysis: Idealized stress–strain diagram, Moment curvature relationships, Shape factors for various sections, Plastic hinge, Upper bound and lower bound theorems; Collapse loads and plastic moments for simply supported beams, Propped cantilevers, Fixed beams and continuous beams.

Total Periods: *45*

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. V. N. Vazirani, M. M. Ratwani and S. K. Duggal, *Analysis of Structures– Vol. I and Vol. II*, Khanna Publications, 17th Edition, 2013.
2. R. Vaidyanathan and P. Perumal, *Structural Analysis - Vol. I and II*, Laxmi Publications, 4th Edition, 2016.

REFERENCES:

1. Bhavikatti, S. S., *Structural Analysis– Vol. I and II*, Vikas Publishing House, 4th Edition, 2013.
2. R. S. Khurmi and N. Khurmi., *Theory of Structures*, S. Chand & Company Ltd., 21th Edition, 2020.
3. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS–II – Theory of Structures*, Laxmi Publications (P) Ltd., 13th Edition, 2017.
4. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, Dhanpat Rai Publishing Co. Ltd., 9th Edition, 2014.

ADDITIONAL LEARNING RESOURCES:

1. Devdas Menon, *Structural Analysis,* Alpha Science International Ltd., 2nd Edition, 2017.
2. Hibbeler, R. C., *Structural Analysis,* Pearson Education, 9th Edition, 2017.
3. Wang, C. K., *Intermediate Structural Analysis,* McGraw Hill Education, 2017.
4. Alan Williams., *Structural Analysis: In Theory and Practice,* Butterworth-Heinemann, 2009.
5. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures – Vol. I and II*, Tata Mc–Graw Hill Publishing Co. Ltd., 2nd Edition, 1999.
6. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications Pvt. Ltd., 2001.

II B. Tech. – II Semester
(19BT4HS01) BANKING AND INSURANCE
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

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

CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.

CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

DETAILED SYLLABUS:

UNIT I–INTRODUCTION TO BANKING   **(9 periods)**

Meaning - Importance of banking - Functions of banking - **Reserve Bank of India**: Functions – Role of RBI in sustainable development.

UNIT II–BANK-CUSTOMER RELATIONSHIP   **(9 periods)**

Debtor-creditor relationship, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account - Loans and Advances- Principles of lending and types of loans.

UNIT III–ELECTRONIC PAYMENT SYSTEM & BUSINESS MODELS (9 periods)

Introduction to Online Banking - types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Debit cards and Electronic Wallet - Business models: B2B, B2C, C2C and B2G.

UNIT IV–INTRODUCTION TO RISK AND INSURANCE   **(9 periods)**

Concept of risk, risk *Vs* uncertainty. **Insurance**: Definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT V–INSURANCE OVERVIEW   **(9 periods)**

Principles and Functions of Insurance - Types of Insurance - LIC and GIC - IRDA - Insurance Players in India.

                          Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. RanganadhaChary,A.V. and Paul, R.R., *Banking and Financial system*, Kalyani Publisher, New Delhi, 3rd edition, 2016.

2. Sharma,R.K., Shashi K. Gupta and Jagwant Singh, *Banking and Insurance*, Kalyani Publishers, New Delhi, 17th edition, 2014.

REFERENCES BOOKS:

1. *Indian Institute of Banking & Finance,Digital Banking*, Taxmann Publications Pvt. Ltd., 2016

2. Jyotsna Sethi and Nishwan Bhatia, *Elements of Banking and Insurance*, PHI Learning Pvt. Ltd., 2nd edition, 2012.

II B. Tech. – II Semester
(19BT4HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

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

CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.

CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

DETAILED SYLLABUS:

UNIT I–COST ACCOUNTING   **(9 periods)**

Meaning of Cost and Cost Accounting, Objectives, Scope, Advantages and disadvantages – Cost Accounting *Vs* Management Accounting – Elements of Costing – Installation of costing system – Material Control, Labour Control, Overhead Control.

UNIT II–COST SHEET & PREPARATION OF COST SHEET   **(9 periods)**

Analysis of Cost – Importance of Costing while pricing the products - Preparation of cost sheet, estimate, tender and quotation (Simple problems).

UNIT III–STANDARD COSTING & VARIANCE ANALYSIS   **(9 periods)**

Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labour variances (Simple Problems).

UNIT IV–FINANCIAL MANAGEMENT& RATIO ANALYSIS   **(9 periods)**

Meaning, Objectives - Nature and Scope, Importance of FM – **Ratio Analysis**: Solvency ratios, Liquidity ratios, Profitability ratios, Financial Statement Analysis through ratios (Simple Problems).

UNIT V–INTRODUCTION TO INVESTMENT   **(9 periods)**

Investment – Meaning and Definition- concept of risk and returns-Investment Alternatives- Capital Budgeting techniques – Security Analysis and Portfolio Management (Basic concepts).

                                                  Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting*, Kalyani Publishers, Ludhiana, 10th edition, 2016.
2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 14th edition, 2016.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. CA SaravanaPrasath, *Cost Accounting and Financial management*, Wolters Kluwer India Pvt. Ltd., New Delhi, 2018 edition, 2018.

II B. Tech. - II Semester
(19BT4HS05) GENDER AND ENVIRONMENT
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender &environmental security.

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

CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.

CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.

CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

DETAILED SYLLABUS:

UNIT I–GENDER ANDENVIRONMENT RELATIONSHIP   (9 periods)

Introduction–Gender and Environment–Development of gender roles–Society, gender & environment – Understanding environmental politics – Gender-environment connections–Eco-feminism - Cultural eco-feminism–Social eco-feminism - Feminist political ecology.

UNIT II–GENDERED ROLES IN THE FAMILY & COMMUNITY   (9 periods)

Organization of the household – Domestic division of labour - Food: growing, harvesting, shopping, preparing, and cooking.

Gender & Power- Planning – Politics – NGO – Gendering of environmental protest – Environmental decision-making.

UNIT III–GENDER ANDSUSTAINABLE DEVELOPMENT   (9 periods)

Concept of sustainability & its achievement – Concept of sustainable development – Ecological Modernization – Gender & sustainability debates – Gender & sustainable development debates - Gender in policy documents – Gender, poverty & equity in sustainable development.

UNIT IV–GENDER IN ENVIRONMENTAL JUSTICE   (9 periods)

Normative Concerns (Fairness, Inequality & Justice) - Making sense of Environmental justice – Ecological debt, Transnational harm, & human rights – Ecological justice – Gender & Environmental Justice – Gender, Vulnerability & risk – Women in

environmental justice movements – Knowledge & participation – Gender, sustainability & justice as guiding concepts.

UNITV–GENDER AND ENVIRONMENTAL SECURITY   (9 periods)

Connections between security & the environment – **Gender, environment & security**: Sustainability as security - poverty & insecurity – Insecurity as injustice – Competing ways of thinking security – Reflecting on sources of insecurity – **Case Study** – Food Security -**Case Study** – The impacts of natural disasters.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Nicole Detraz, *Gender and the Environment*, Polity Press, Cambridge, UK, 2017.

2. Susan Buckingham- Hatfield, *Gender and Environment*, Routledge, London, 2000.

REFERENCE BOOKS:

1. Promillakapur (ed). (2000). "*Empowering Indian Women*" Publication Division, Government of India, New Delhi.

2. Ronnie Vernooy, (Ed). (2006). "*Social and gender Analysis Natural Resource Management: Learning studies and lessons from Aisa*" Sage, New Delhi.

3. Swarup, Hemlata and Rajput, Pam. (2000). *Gender Dimensions of Environmental and Development Debate: The Indian Experience*" In SturatS.Nagel, (ed). "India"s Development and Public Policy", Ashgate, Burlington.

(19BT4HS07) **INDIAN ECONOMY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.

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

CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.

CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

DETAILED SYLLABUS:

UNIT I–INTRODUCTION   **(9 periods)**

Economics - Flow in an Economy, Law of Supply and Demand; Micro and Macro Economics; Relationship between Science, Engineering, Technology and Economic Development; Concept of Engineering Economics-Types of Efficiency, Definition and Scope of Engineering Economics.

UNIT II–ELEMENTARY ECONOMIC ANALYSIS   **(9 periods)**

Economic Analysis – Meaning, Significance, Simple Economic Analysis; Material Selection for a Product, Substitution of Raw Material; Design Selection for a Product; Material Selection-Process Planning, Process Modification.

UNIT III–ECONOMIC PLANNING   **(9 periods)**

Introduction - Need For Planning in India, Five year plans(1951-2012), NITI Aayog (from 2014 onwards); Inclusive Growth-Meaning, Significance, Need for inclusive growth in India, Strategy for more inclusive growth, Challenges and Prospects; Employment and Inclusive Growth in India, Role of engineers in sustaining inclusive growth.

UNIT IV–TIME VALUE OF MONEY   **(12 periods)**

Concepts and Application; Capital Budgeting-Traditional and Modern Methods; Simple and Compound Interest, Cash Flow Diagram, Principle of Economic Equivalence; Evaluation of Engineering Projects – Present Worth Method, Future Worth Method, Annual Worth Method, Internal Rate of Return Method, Cost-benefit Analysis in Public Projects; Depreciation Policy-Depreciation of Capital Assets, Causes of Depreciation, Straight Line Method and Declining Balance Method.

UNIT V–VALUE ANALYSIS/VALUE ENGINEERING   **(6 periods)**

Introduction - Value Analysis, Value Engineering, Functions, Aims; Value Analysis vs Value Engineering; Value Engineering Procedure- Advantages, Application Areas.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Panneerselvam. R., *Engineering Economics*, PHI Learning Private Limited, New Delhi, 2nd edition, 2013.

2. Jain. T. R., V. K. Ohri, O. P. Khanna. *Economics for Engineers*. VK Publication, 1st edition, 2015.

REFERENCE BOOKS:

1. DuttRudar and Sundhram K. P. M., *Indian Economy*, S. Chand, New Delhi, 62nd revised edition, 2010.

2. Misra. S. K. and V. K. Puri., *Indian Economy*: Its Development Experience, Himalaya Publishing House, Mumbai, 32nd edition, 2010.

II B. Tech. – II Semester

(19BT4HS09) LIFE SKILLS

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.

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

CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.

CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.

CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

DETAILED SYLLABUS:

UNIT I–POSITIVE ATTITUDE (9 periods)

Introduction, Features of attitudes, Formation of attitudes, Ways of changing attitude in a person, Attitude in a work place, Developing positive attitude, Obstacles in developing positive attitude, Measuring attitude.

UNIT II–SELF DISCOVERY AND INTERPERSONAL RELATIONSHIPS (9 periods)

Importance of knowing yourself, Process of knowing yourself, SWOT Analysis, Elements of attitude in interpersonal relationships, Methods to deal with different types of interpersonal relationship skills.

UNIT III–CROSS-CULTURAL COMMUNICATION (9 periods)

Different Communication Styles, Cultural variables, communication sensitivity and variables of national culture, Individual Cultural Variables, Cross-cultural Communication Strategies, Potential hot spots in cross-cultural communication, Cross-cultural communication – Basic Tips.

UNIT IV–CORE THINKING, PROBLEM SOLVING AND DECISION MAKING

(9 periods)

Process of developing core thinking skills, Categories of thinking: Critical & Creative, Understanding problem solving, Cause of problems, Stages of problem solving, Methods of problem solving, Types of decision making.

UNIT V–BUSINESS PRESENTATIONS AND PUBLIC SPEAKING (9 periods)

Business presentations and speeches, structuring the material, Types of delivery, Guidelines for delivery, Effective sales presentation, Controlling nervousness and stage fright.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Dr. K. Alex (2018) *Soft Skills*, S. Chand and Company Limited, New Delhi.
2. Manmohan Joshi (2017) *Soft Skills*, bookboon.com, Bangalore.

REFERENCE BOOKS:

1. Meenakshi Raman and Prakash Singh (2013), *Business Communication*, Oxford University Press, New Delhi.
2. Jeff Butterfield (2011) *Soft Skills for Everyone*, Cengage Learning India Private Limited, Delhi.

II B. Tech. – II Semester

(19BT4HS11) PROFESSIONAL ETHICS

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.

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

CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.

CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.

CO3. Apply the nuances of professional ideals at work place and in social context.

DETAILED SYLLABUS:

UNIT I–ENGINEERING ETHICS   (9 periods)

Scope and aim of engineering ethics, Senses of engineering ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy-Kohlberg's theory, Gilligan's theory, Consensus and controversy.

UNITII–PROFESSIONAL IDEALS AND VIRTUES   (8 periods)

Theories about virtues, Professions, Professionalism, Characteristics, Expectations, Professional responsibility, Integrity, Self-respect, Sense of responsibility, Self-interest, Customs and religion, Self-interest and ethical egoism, Customs and ethical relativism, Religion and divine command ethics, Use of ethical theories, Resolving moral dilemmas and moral leadership.

UNIT III–ENGINEERING AS SOCIAL EXPERIMENTATION   (10 periods)

Engineering as experimentation, Similarities to standard experiments, Learning from the past and knowledge gained, Engineers as responsible experimenters, Conscientiousness, Moral autonomy and accountability, The challenger case, Codes of ethics and limitations, Industrial standards, Problems with the law of engineering.

UNIT IV–RESPONSIBILITIES AND RIGHTS   (9 periods)

Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, Rights of engineers, Professional rights, Whistle-blowing, The BART case, Employee rights and discrimination.

UNITV–GLOBAL ISSUES   (9 periods)

Multinational corporations, Professional ethics, Environmental ethics, Computer ethics, Engineers as consultants, Witnesses, Advisors and Leaders, Engineers as Managers, Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd edition, 2007.
2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

II B. Tech. – II Semester

(19BT4HS13) INDIAN TRADITION AND CULTURE

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

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

CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.

CO2. Understandthe impact ofsocio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

DETAILED SYLLABUS:

UNIT I–BASIC TRAITS OF INDIAN CULTURE   (9 periods)

Meaning and definition and various interpretations of culture, Culture and its features. The Vedic and Upanishadic culture and society. Human aspirations and values in these societies. Chaturvidhapurushardhas, Chaturashrma and Chaturvarna theory.

UNIT II–HUMANISTIC REFORMS UNDER JAINISM AND BUDDHISM (9 periods)

Salient features of Jainism - contributions of Jainism to Indian culture. Contributions of Aachaarya and Mahaapragya. Buddhism as a humanistic culture. The four noble truths of Buddhism. Contributions of Buddhism to Indian culture.

UNIT III–CULTURE IN THE MEDIEVAL PERIOD   (9 periods)

Unifications of India under Mouryas and Guptas and their cultural achievements.Cultural conditions under satavahanas. Contributions to pallavas and cholas to art and cultural achievements of vijayanagara rulers.

UNIT IV–SOCIO RELIGIOUS REFORMS IN INDIAN CULTURE   (9 periods)

Western impact on India, Introduction of western education, social and cultural awakening and social reform movements of Rajaramohan Roy - Dayanandha Saraswathi-Anne Besant (theosophical society).

UNIT V–REFORM MOVEMENTS FOR HARMONIOUS RELATIONS   (9 periods)

Vivekananda, Eswarchandravidyasagar and Veeresalingam - emancipation of women and struggle against caste. Rise of Indian nationalism. Mahatma Gandhi- Nonviolence and satyagraha and eradication of untouchability.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK(S):

1. ValluruPrabhakaraiah, *Indian Heritage and Culture*, Neelkamal Publications Pvt. Ltd. Delhi, First Edition, 2015.

REFERENCE BOOKS:

1. L. P. Sharma, *History of Ancient India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
2. L. P. Sharma, *History of Medieval India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
3. L. P. Sharma, *History of Modern India*, Konark Publishers, Pvt. Ltd. New Delhi, 2010.
4. The Cultural Heritage of India Vol-I, II, III, IV, V, The Ramakrishna Mission Institute of Culture, Calcutta.

II B. Tech. - II Semester

(19BT40106) DISASTER MITIGATION AND MANAGEMENT

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

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

CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT I–DISASTERS   (9 periods)

Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT II–EARTHQUAKES   (9 periods)

Introduction to earthquake, Intensity scale (MSK–64), Seismic zones and activity in India, Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Concepts of Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies, Case studies.

UNIT III–FLOODS, CYCLONES AND DROUGHTS   (11periods)

Floods and Cyclones: Onset, Types, Causes, Warnings, Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation, Case studies.

Droughts: Onset, Types and warning; Causes, Impact, Early warning and response mechanisms, Mitigation strategies, Droughts in India, Case studies.

UNIT IV–LANDSLIDES   (8periods)

Onset, Types and warning; Causes, Elements at risk, Indian landslides, Hazards zones, Typical effects, Mitigation strategies and community based mitigation, Case studies.

UNIT V–DISASTER MANAGEMENT   (8periods)

Disaster management organization and methodology, Disaster management cycle, Disaster management in India – Typical cases and Cost–benefit analysis, Disaster management programs implemented by NGOs and Government of India, Usage of GIS and Remote sensing techniques in disaster management, Leadership and Coordination in Disaster management, Emerging trends in disaster management.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. V. K. Sharma, *Disaster Management, Medtech Publishing, 2nd Edition, 2013*.
2. Anand S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians*, GOI–UNDP Disaster Risk Management Programme, Government of India, National Disaster Management Division, Ministry of Home Affairs, New Delhi, Version 1.0, 2005.

REFERENCE BOOKS:

1. Donald Hyndman and David Hyndman, *Natural Hazards and Disasters*, Cengage Learning, 3rd Edition, 2011.
2. *Disaster Management in India,*A Status Report, Ministry of Home Affairs, Govt. of India, May 2011.
3. Rajendra Kumar Bhandari, *Disaster Education and Management: A Joyride for Students, Teachers, and Disaster Managers*, Springer India, 2014.
4. R. B. Singh, *Natural Hazards and Disaster Management*, Rawat Publications, 2009.

ADDITIONAL LEARNING RESOURCES:

1. Tushar Bhattacharya, *Disaster Science and Management*, McGraw Hill, 2014.

(19BT40107) **SUSTAINABLE ENGINEERING**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.

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

CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.

CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.

CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT I–PRINCIPLES OF SUSTAINABILITY   **(9 periods)**

Emerging challenges, Sustainability and sustainable engineering; Environmental concerns; Social, economic and legal issues; Availability and depletion of natural resources, Disaster resiliency; Multilateral environmental agreements – Basel convention, Clean development mechanism (CDM), Montreal and Kyoto protocols.

UNIT II–SUSTAINABILITY METRICS AND ASSESSMENT TOOLS   **(9 periods)**

Sustainability indicators, metrics and assessment tools, Material flow analysis and material budget, Carbon footprint analysis, Life cycle assessment, Streamlined life-cycle assessment (SLCA), Economic input output-life cycle analysis, Environmental health risk assessment, Other emerging assessment tools.

UNIT III–SUSTAINABLE ENGINEERING PRACTICES   (9 periods)

Sustainable energy engineering, Sustainable waste management, Green and sustainable buildings and infrastructure, Sustainable civil infrastructure, Sustainable remediation of contaminated sites, Climate geoengineering.

UNIT IV–SUSTAINABLE ENGINEERING APPLICATIONS   (9 periods)

Environmental and chemical engineering projects, Materials engineering projects, Infrastructure engineering projects – Background, Methodology, Goal and Scope, Study area, Technical design, Environmental sustainability, Life cycle assessment, Economic sustainability, Social sustainability, Rating systems – ENVISION, LEED, GRIHA, IGBC; Conclusions.

UNIT V–SUSTAINABLE URBANIZATION AND INDUSTRIALIZATION (9 periods)

Sustainable urbanization and industrialization, United Nations sustainable development goals – Right to education, Poverty eradication, Social and technological changes; Industrial Processes - Material selection, Energy efficiency, Pollution prevention and control techniques, Industrial Ecology, Industrial symbiosis.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Reddy, K.R., Cameselle, C., and Adams, J.A., *Sustainable Engineering: Drivers, Metrics, Tools, and Applications*, John Wiley &Sons, Inc., Hoboken, New Jersey, 2019, 544p (ISBN: 978-1-119-49393-8).

2. Allen, D. T. and Shonnard, D. R., *Sustainability Engineering: Concepts, Design and Case Studies*, Pearson Education, 1st Edition, 2012.

REFERENCE BOOKS:

1. Bradley. A.S; Adebayo,A.O., Maria, P.,*Engineering Applications in Sustainable Design and Development*, Cengage Learning, 1st Edition, 2016.

2. Purohit, S. S., *Green Technology: An Approach for Sustainable Environment*, Agrobios Publication, 1st Edition, 2016.

3. *Energy Conservation Building Code (ECBC) 2007*, Bureau of Energy Efficiency, Govt. of India, New Delhi.

4. Twidell, J. W. and Weir, A. D., *Renewable Energy Resources*, Routledge, Taylor & Francis Group, 3rd Edition, 2015.

ADDITIONAL LEARNING RESOURCES:

1. Daniel A. Vallero and Chris Brasier, *Sustainable Design: The Science of Sustainability and Green Engineering*, Wiley-Blackwell, 1st Edition, 2008.

2. Jorge A. Vanegas, *Sustainable Engineering Practice: An Introduction*, Committee on Sustainability, American Society of Civil Engineers, https://doi.org/10.1061/9780784407509, 2004.

3. Mackenthun, K.M., *Basic Concepts in Environmental Management*, CRC Press, Taylor & Francis Group, 1st Edition, 1999.

4. *Environment Impact Assessment Guidelines*, Notification of Government of India, 2006.

II B. Tech. - II Semester
(19BT40108) CONTRACT LAWS AND REGULATIONS
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

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

CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.

CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.

CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.

CO4. Analyze legal issues pertaining to contracts and tenders considering society.

CO5. Analyze labour regulations to address labour safety issues.

DETAILED SYLLABUS:

UNIT I–CONSTRUCTION CONTRACTS   (9periods)

Indian contracts act, Elements of contracts, Types of contracts, Features, Suitability, Design of contract documents, International contract document and laws, Standard contract document, Law of torts.

UNIT II–TENDERS   (9periods)

Prequalification, Bidding, Accepting; Evaluation of tender from technical, contractual and financial points of view; Two cover system, Preparation of the documentation, Contract formation and interpretation, Potential contractual problems, Price variation clause, Comparison of actions and laws, Subject matter, Violations, Latest developments in tendering.

UNITIII–ARBITRATION   (9periods)

Arbitration, Comparison of actions and laws, Agreements, Appointment of arbitrators, Conditions of arbitration, Powers and duties of arbitrator, Rules of evidence, Enforcement of award, Arbitration disputes, Dispute review board.

UNIT IV–LEGAL REQUIREMENTS   (9 periods)

Legal requirements for planning, Property law, Agency law, Tax laws – Income tax, Sales tax, Excise and custom duties, Local government approval, Statutory regulations, Insurance and bonding, Laws governing purchase and sale, Use of urban and rural land, Land revenue codes, EMD, Security deposits, Liquidated damages.

UNIT V – LABOUR REGULATIONS   **(9periods)**

Social security, Welfare legislation; Laws relating to wages, bonus and industrial disputes; Labour administration, Insurance and safety regulations, Workmen's compensation act, Maternity benefit act, Child labour act, Other labour laws.

                                                                   Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. SubbaRao, G.C.V., *Law of Contracts I & II*, S. Gogia& Co., 11th Edition, 2011.

2. Jimmie Hinze, *Construction Contracts,*McGraw Hill, 3nd Edition, 2011.

REFERENCES BOOKS:

1. Kishore Gajaria, *GT Gajaria's Law Relating to Building and Engineering Contracts in India*, Lexis NexisButterworths India,4th Edition, 2000.

2. Patil, B. S., *Civil Engineering Contracts and Estimates*, University Press (India) Private Ltd., 4thEdition, 2015.

3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill Education,7th Edition, 2010.

4. AkhileshwarPathak, *Contract Law*, Oxford University Press, 2011.

ADDITIONAL LEARNING RESOURCES:

1. P.C. Markanda, Naresh Markanda, Rajesh Markanda, *Building and Engineering Contracts- Law and Practice*, Vol-I and II, 5thEdition, LexisNexis Publication.

II B. Tech. - II Semester

(19BT40306) GLOBAL STRATEGY AND TECHNOLOGY

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

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

CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.

CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.

CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.

CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

DETAILED SYLLABUS:

UNIT I–STRATEGIC MANAGEMENT **(9 periods)**

Introduction, Classes of decisions, Levels of strategy, Core competence, Strategic intent and stretch, Approaches to strategy making, Roles of different strategists, Strategic management-Process, Benefits, Limitations; Ethics in strategic decision making, Principles of good strategy, Strategic Management in India; Common managerial strategy formulation tools.

UNIT II–GLOBALIZATION **(9 periods)**

Definition, Stages, Essential conditions for globalization, Globalization strategies, Competitive advantage of Nations and regions, Factors affecting Globalization, Globalization of Indian business.

UNIT III–RESEARCH & DEVELOPMENT STRATEGIES **(9 periods)**

Concept, Evolution of R and D Management, R and D as a business, R and D as competitive advantage, Elements of R and D strategies, Integration of R and D, Selection and implementation of R and D strategies, R and D trends and challenges.

UNIT IV–TECHNOLOGY MANAGEMENT AND TRANSFER **(9 periods)**

TechnologyManagement: Introduction, Technology-Definition, Components, Classification Features; Technology Management-Concept, Nature; Drivers of Management of Technology-Significance, Scope, Responding to technology challenges.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of process, Types of Technology Transfer, Package, Modes of Transfer, Routes, Channels and Effectiveness of Technology Transfer.

UNIT V–CORPORATE GOVERNANCE: THE INDIAN SCENARIO   (9 periods)

Emergence of corporate governance in India-Landmarks, Models, Codes and status in India, Role and Responsibilities of Regulators, The Board of Directors; Corporate Governance- Specific issues in India, Family owned Business, Corporate Governance and the Indian ethos.

Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Francis Cherunilam, *Strategic Management*, Himalaya Publishing House, 3rdEdition, 2002.
2. C. S. G. Krishnamacharyulu and Lalitha Ramakrishnan, *Management of Technology*, Himalaya Publishing House, Second Edition, 2012.

REFERENCE BOOKS:

1. White and Bruton, *The Management of Technology and Innovation:A Strategic Approach*, Cengage Learning, 1stEdition, 2007.
2. S.K.Mandak, *Ethics in Business and Corporate Governance*, TMH, 2ndEdition, 2012.

II B. Tech. - II Semester
(19BT40307) MANAGEMENT SCIENCE
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.

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

CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.

CO2. Apply the concepts of HRM for selection and management of human resources.

CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.

CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.

CO5. Develop network models in time-cost tradeoff for effective project management.

DETAILED SYLLABUS:

UNIT I–MANAGERIAL FUNCTION AND PROCESS   (10 periods)

Concept and foundations of management, Evolution of management thought; Managerial functions – Planning, Organizing, Directing and Controlling; Decision-making; Role of manager, managerial skills; Managing in a global environment, Flexible systems management; Social responsibility and managerial ethics; Process and customer orientation; Managerial processes on direct and indirect value chain.

UNITII–HUMAN RESOURCE MANAGEMENT   (8 periods)

Human Resource challenges; Human Resource Management functions; Human Resource Planning; Job analysis; Job evaluation, Recruitment and selection; Training and Development; Promotion and transfer; Performance management; Compensation management and benefits; Employee morale and productivity; Human Resource Information System.

UNITIII–OPERATIONS MANAGEMENT   (10 periods)

Fundamentals of Operations Management, Services as a part of operations management; Facilities location and layout; Line balancing; Quality management – Statistical Process Control, Total Quality Management, Six sigma; Role and importance of materials management, Value analysis, Make or Buy decision, Inventory control, Materials Requirement Planning, Enterprise Resource Planning, Supply Chain Management.

UNITIV–MARKETING MANAGEMENT (8 periods)

Concept, evolution and scope; Marketing strategy formulation and components of marketing plan; Segmenting and targeting the market; Positioning and differentiating the market offering, Analyzing competition; Product strategy; Pricing strategies; Designing and managing marketing channels; Integrated marketing communications.

UNIT V–PROJECT MANAGEMENT (9 periods)

Project management concepts; Project planning – Work Breakdown Structure, Gantt chart; Project scheduling – Critical Path Method, Program Evaluation and Review Technique, Crashing the project for time-cost trade off; Resource Levelling.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. MartandT.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd Edition, 2006.
2. Koontz and Weihrich, *Essentials of Management*,TMH, 6th Edition, New Delhi, 2007.

REFERENCE BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons,2010.
2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd Edition, New Delhi.
3. L.M. Prasad, *Principles and practice of Management*, S. Chand and Sons, 2006.

II B. Tech. - II Semester

(19BT40504) CYBER LAWS AND SECURITY

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.

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

CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.

CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.

CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.

CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

DETAILED SYLLABUS:

UNIT I–EVOLUTION OF CYBERSPACE AND JURISDICTION IN BORDERLESS CYBERSPACE (9 periods)

The Evolution of Cyberspace: Significance of information technology, Drawbacks in information technology, the digital divide, E-governance, Origin of cyberspace, Legal issues in cyberspace, regulating the Internet.

Jurisdiction in the Borderless Cyberspace: Meaning of jurisdiction, Three pre-requisites of jurisdiction, Jurisdictional theories in jurisdiction to prescribe, Tests to determine jurisdiction in Internet law cases, Indian laws to determine personal jurisdiction, Jurisdiction clauses in click wrap agreement.

UNIT II–ELECTRONIC CONTRACTING AND ELECTRONIC COMMERCE (9 periods)

Electronic Contracting: Formation of offline contracts under English common law, Fundamental requirements of an offline contract, Forming an E-contract through website, E-mail contracting, The Indian approach of E-contracts, Contract formation on the Internet and Information Technology Act 2000, B2C E-contracts.

Electronic Commerce: Models, Advantages, Restricted activities, Laws, India's information Technology Act2000, Online customer protection in India(B2B, B2C).

UNIT III–ELECTRONIC SIGNATURES AND ELECTRONIC MONEY(9 periods)

Electronic Signatures: The role of signatures, Significance of electronic signatures, Modes of electronic signatures, UNCITRAL model law on electronic signatures 2001, Cryptography, Role of certifying authority in PKI, The Indian Information Technology Act

and electronic signatures- Electronic signatures, Prescribed authentication mechanisms, Secure electronic record.

Electronic Money: E-Money, RBI's guidelines on mobile banking and payments, The current E-payment systems, Earlier E-payment systems, Credit cards, Use of SET in online payment system.

UNIT IV–INTELLECTUAL PROPERTY RIGHTS AND THE INTERNET WORLD

(9 periods)

Protecting copyright in the E-world, International organizations protecting Intellectual Property, Copyright issues on the Internet, Digital rights management, Patent protection and computer software, India and copyright protection for computer software, Business method patents- Position of Business methods patents in India, Trademark protection on the Internet, Cybersquatting, The Indian trademark law and legal remedies, Hyper linking and framing.

UNIT V–CYBERCRIMES AND PROTECTING PRIVACY ON INTERNET(9 periods)

Cybercrimes: What is cybercrime, Categories, Different kinds of cybercrime, Cybercrimes and Information Technology Act, 2000 - Territorial scope and applicability, India's national cyber security policy.

Protecting Privacy on the Internet: Meaning of privacy, Threat to privacy on the Internet, Use of cookies and web bugs, Terms of use and privacy policy, Government right to interception, Employee privacy rights, Indian legal framework for data protection and privacy, Challenges to right of privacy in India.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK(S):

1. Karnika Seth, *Computers Internet and New technology Laws*, LexisNexis, 2013.

REFERENCE BOOKS:

1. Sarika Gupta, Gaurav Gupta, *Information Security and Cyber Laws*, Khanna Publishing, 2019.
2. Vivek Sood, *Cyber Law Simplified*, McGraw Hill,2018.
3. Pavan Duggal, *Textbook on Cyber Law*, Universal LexisNexis, 2019.

ADDITIONAL LEARNING RESOURCES:

- https://swayam.gov.in/nd2_cec20_cs09/preview
- https://swayam.gov.in/nd2_nou19_cs08/preview

II B. Tech. – II Semester

(19BT50208) INTELLECTUAL PROPERTY RIGHTS

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; TradeSecrets; Unfair Competition; New Development of Intellectual Property.

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

CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.

CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.

CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.

CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

DETAILED SYLLABUS:

UNIT I–INTRODUCTION TO INTELLECTUAL PROPERTY   (10 periods)

Introduction and the need for intellectual property rights (IPR); types of intellectual property- Design, Geographical Indication; International organizations, agencies and treaties.

UNIT II–TRADEMARKS   (8 Periods)

Introduction to trademark, Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT III–LAW OF COPYRIGHTS   (9 Periods)

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT IV–TRADESECRETS   (9 periods)

Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT V–NEW DEVELOPMENT OF INTELLECTUAL PROPERTY   (9 periods)

New developments in: trade mark law, copy right law, patent law, intellectual property audits. International overview on intellectual property; international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Deborah, E. Bouchoux, *Intellectual property: The law of Trademarks, Copyright, Patents, and Trade Secrets,* Cengage learning, 4th edition, 2013.

2. PrabuddhaGanguli, *Intellectual property right - Unleashing the knowledge economy*, Tata McGraw Hill Publishing Company Ltd.

REFERENCE BOOKS:

1. Neeraj P and Khusdeep D. *Intellectual Property Rights*. India, IN: PHI learning Private Limited. 1st edition 2019.

ADDITIONAL LEARNING RESOURCES:

1. Subramanian, N., &Sundararaman, M. (2018). *Intellectual Property Rights – An Overview*. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf

2. World Intellectual Property Organisation. (2004). *WIPO Intellectual property Handbook*. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

II B. Tech. - II Semester

(19BT50409) GREEN TECHNOLOGIES

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

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

CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.

CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.

CO3. Understand the environmental impacts of IT and approaches for Green IT.

CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.

CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

DETAILED SYLLABUS:

UNIT I–PRINCIPLES OF GREEN ENGINEERING AND GREEN COMMUNICATIONS
(9 periods)

Principles of Green Engineering: Introduction, Definition of green engineering, Principles of green engineering

Green Communications: Introduction, Origin of Green Communications, Energy Efficiency in Telecommunication systems, Telecommunication system model and energy Efficiency, Energy saving concepts, Quantifying energy efficiency in ICT, Energy efficiency metrics of green wireless networks, Embodied energy of communication devices- Introduction, The extended energy model, Embodied/Operating Energy of a BS in Cellular network- A Case study; Energy efficient standards for wireline communications.

UNIT II–GREEN ENERGY **(9 periods)**

Introduction, green energy systems - composition, adverse impacts,Green energy and sustainability, the target and solution.Diversification and localization of energy systems, green energy and sustainable development.Energy sources and their availability. Green energy sources - solar energy, wind energy, geothermal energy, ocean energy, biomass and biogas.

UNIT III–GREEN IT **(9 periods)**

Introduction, Awareness to Implementation: Green IT Trends, Green Engineering, Greening by IT: Using RFID for Environmental Sustainability, Smart Grids, Smart Buildings and Homes, Green Supply Chain and Logistics, Enterprise-Wide Environmental Sustainability, A Seven-Step Approach to Creating Green IT Strategy: Balancing the Costs and Benefits of Going Green, Research and Development Directions.

UNIT IV–GREEN CONSTRUCTION (9 periods)

Green Building: Concept, Necessity, Characteristics, Benefits, Requisites for green building construction, Sustainability, Concept of REDUCE, REUSE, RECYCLE, RETHINK, REPLENISH AND REFUSE (6 R's), Sustainable construction focus point – Site selection, Planning, Water, Energy, Material, Indoor air quality, Construction procedures, case studies of residential and commercial green buildings.

Vastu: Concept, History, scientific approach, elements of vastu for selecting a plot.

Indian Green Building Council: Introduction to IGBC green homes, Benefits of IGBC, IGBC green home rating system, Introduction to USGBC, LEED rating system, Procedure to get IGBC certification, GRIHA Rating.

UNIT V – GREEN MANUFACTURING (9 periods)

Green Manufacturing - Introduction, Background and Definition; Impact of traditional manufacturing in environmental ecology, Need for green manufacturing, Motivation and barriers to green manufacturing, Advantages and Limitations of green manufacturing, Green manufacturing strategies,Green manufacturing and sustainability, Green manufacturing through clean energy supply, Green packaging and Supply chain.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. KonstantinosSamdanis, Peter Rost, Andreas Maeder, MichelaMeo, Christos Verikoukis, *Green Communications: Principles, Concepts and Practice*, John Wiley & Sons, 2015.

2. G.D. Rai, *Non-conventional Energy Sources*, KhannaPublishers, Delhi, 5th Edition,2011.

3. San Murugesan, G.R. Gangadharan, *Harnessing Green IT – Principles and Practices*, John Wiley & Sons Ltd., 2008.

4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, *Green Building Handbook*, Volume 1, E & FN Spon, an imprint of Thomson Science & Professional.

5. J Paulo Davim, *Green Manufacturing: Processes and Systems*, Springer, 2012.

6. David A Dornfeld, *Green Manufacturing: Fundamentals and Applications*, Springer, 2013.

REFERENCE BOOKS:

1. Soli J. Arceivala, *Green Technologies for a better future,* McGraw Hill Education (India) Pvt. Ltd, 2014.

2. Marty Poniatowski, *Foundation of Green Information Technology, Prentice Hall, 2009.*

3. Athanasios V Alavanidis, ThomaisVlachogianni, *Green Chemistry and Green Engineering*, SynchronaThemata, 2012.

II B.Tech. - II Semester
(19BT40131) ENVIRONMENTAL ENGINEERING LAB

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

PREREQUISITES: Course on Environmental Engineering.

COURSE DESCRIPTION: Experimental analysis of physical, chemical and biological parameters of water and wastewater; Analysis of an ambient air quality.

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

CO1. Evaluate water using various tools and techniques to solve complex water problems by following the standard procedures/norms and latest developments ensuring safety, environment and sustainability.

CO2. Evaluate wastewater using various tools and techniques to solve complex wastewater problems by following the standard procedures/norms and latest developments ensuring safety, environment and sustainability.

CO3. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on water supply and wastewater engineering.

LIST OF EXPERIMENTS:

1. Determination of pH, electrical conductivity and TDS of a given water sample
2. Determination of alkalinity and acidity of a given water sample
3. Determination of total solids, volatile and fixed solids of a given water sample
4. Determination of chlorides of a given water sample
5. Determination of iron and fluoride content of a given water sample
6. Determination of residual chlorine of a given chlorinated water sample
7. Determination of turbidity and optimum coagulant dose of a given water sample
8. Determination of dissolved oxygen and BOD of a given wastewater sample
9. Determination of COD of a given wastewater sample
10. Determination of nitrate nitrogen as NO_3 of a given wastewater sample
11. Determination of sulphates as SO_4 of a given wastewater sample
12. Determination of phosphates as PO_4 of a given wastewater sample
13. Determination of color of a given water or wastewater sample
14. Bacterial examination of a given water or wastewater sample (not for examination)
15. Determination of air pollutants of an ambient air (not for examination)

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Environmental Engineering Lab Manual (SVEC19 Regulations),* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

(19BT40132) **FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

(Common to CE and ME)

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

PRE-REQUISITES: Courses on Fluid Mechanics, Hydraulic Engineering/Fluid Mechanics and Hydraulic Machinery.

COURSE DESCRIPTION: Calibration of flow meters; Verification of Bernoulli's equation; Performance of turbines and pumps; Losses through pipes.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1 Evaluate fluid flow characteristics using appropriate tools and techniques to solve fluid mechanics problems by following latest developments and ensuring safety.

CO2 Evaluate the performance and behaviour of hydraulic machinery using appropriate tools and techniques to solve hydraulic machinery problems by following latest developments and ensuring safety.

CO3 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on fluid mechanics and hydraulic machinery.

LIST OF EXPERIMENTS:

1. Calibration of venturimeter
2. Calibration of orificemeter
3. Determination of coefficient of discharge for a small orifice by a constant head
4. Determination of coefficient of velocity for small orifice by variable head method
5. Calibration of rectangular notch
6. Determination of loss of head due to sudden contraction
7. Determination of coefficient of friction for pipes
8. Verification of Bernoulli's equation
9. Study of impact of jet on vanes
10. Study of hydraulic jump
11. Performance test on Pelton wheel
12. Performance test on Francis turbine
13. Performance test on Kaplan turbine
14. Performance test on single stage centrifugal pump
15. Performance test on multi stage centrifugal pump
16. Performance test on reciprocating pump

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Fluid Mechanics and Hydraulic Machinery Laboratory Manual (SVEC19 Regulations)"*, Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

(19BT40133) **GEOTECHNICAL ENGINEERING LAB**

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

PREREQUISITES: Course on Soil Mechanics.

COURSE DESCRIPTION: Experiments on the determination of index properties and engineering properties of soil.

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

CO1 Evaluate index properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring safety and environment.

CO2 Evaluate engineering properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring safety and environment.

CO3 Perform individually or in a team besides continuous learning and communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

LIST OF EXPERIMENTS:

A. INDEX PROPERTIES OF SOIL

1. Determination of water content
2. Determination of specific gravity
3. Grain size analysis – sieve analysis and hydrometer analysis
4. Tests for Atterberg's limits
   (a) Determination of liquid limit – Casagrande's method and cone penetrometer method
   (b) Determination of plastic limit
   (c) Determination of shrinkage limit
5. Determination of field density – core cutter method and sand replacement method
6. Relative density test

B. ENGINEERING PROPERTIESOF SOIL

1. Standard Proctor's compaction test
2. CBR Test
3. Permeability of soil – constant head test and variable head test
4. Consolidation test
5. Direct shear test
6. Unconfined compression test
7. Tri–axial compression test
8. Vane shear test

REFERENCE BOOKS/LABORATORY MANUALS:

1. *Geotechnical Engineering Laboratory Manual (SVEC19 Regulations),* Department of Civil Engineering, Sree Vidyanikethan Engineering College, Tirupati.

II B.Tech. II Semester
(19BT3MC01) ENVIRONMENTAL SCIENCE
(Mandatory Course)
(Common to CE, ME, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.

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

CO1 Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO2 Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO4 Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

DETAILED SYLLABUS:
UNIT - I: NATURAL RESOURCES   (07 periods)

Multidisciplinary nature of environment; Natural Resources: Renewable and non-renewable resources; Forest, Water, Mineral, Food and Energy resources -Causes, Effects, Remedies, Case studies; Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY   (07 periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT - III: ENVIRONMENTAL POLLUTION AND CONTROL   (06 periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution, Solid waste management – Urban waste, industrial waste; Latest developments in pollution control, Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT   (06 periods)

Sustainable development, Urban problems related to energy, Environmental ethics – Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment justice: National Green Tribunal and its importance; Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT   (04 periods)

Population growth, Population characteristics and variation among nations, Population explosion, Family welfare programme, Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare, Role of information technology in environment and human health; Case studies - Field Work/Assignment/Seminar on Environmental assets – Water bodies/Forest/Grassland/Hill/Mountain.

Total Periods: 30

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik, *Perspectives in Environmental Studies*, New Age International (P) Ltd. Publications, 6th Edition, 2018.
2. Erach Barucha, *Environmental Studies,* Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Cunningham W.P. and Cunningham M.A., *Principles of Environmental Science*, Tata McGraw-Hill Publishing Company, New Delhi, 8th Edition,2016.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2014
4. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1. B. S. Chauhan, *Environmental Studies*, University Science Press, 2nd Edition, 2018.
2. Botkin and Keller, *Environmental Science: Earth as a Living Planet*, John Wiley & Sons, 8th International Student Edition, 2011.
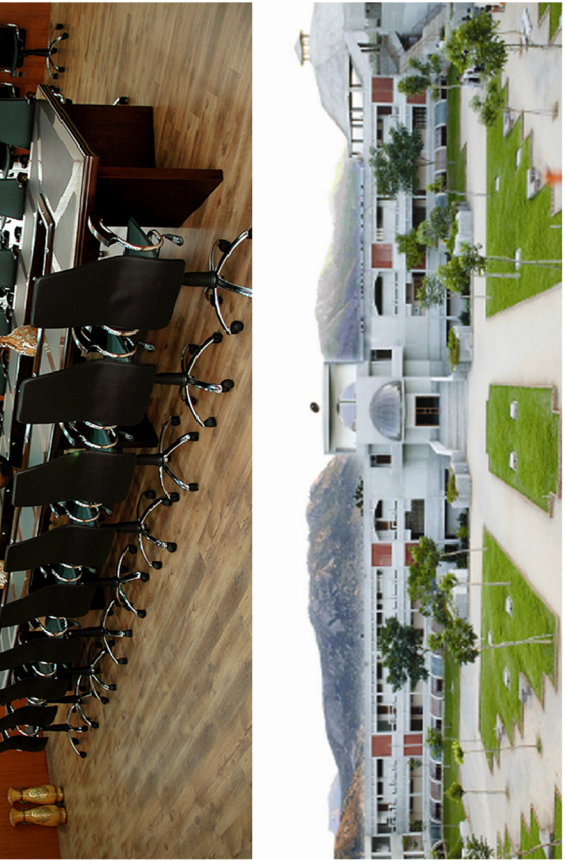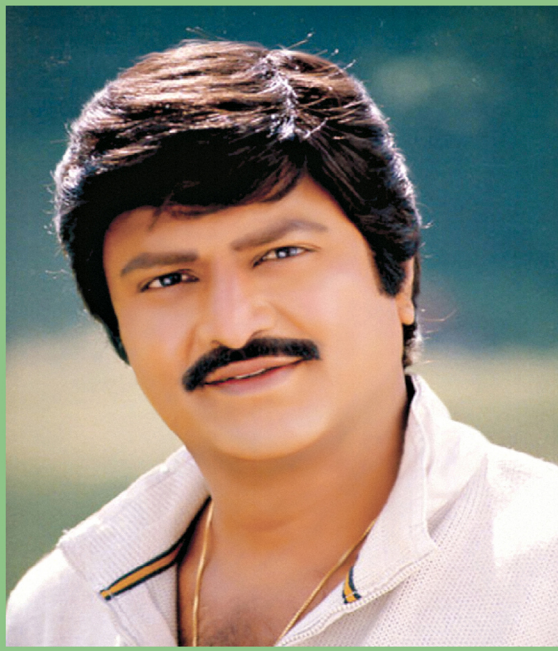
'If there's anything at all that a country like India truly deserves for its children, it is high Quality Educational Institutions that can shape a better Nation'.

Dr. M. Mohan Babu
Chairman.

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