ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

ELECTRICAL AND ELECTRONICS ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

FOR B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)

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

VISION

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

MISSION

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

QUALITY POLICY

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To become the Nation's premiere centre of excellence in electrical engineering through teaching, training, research and innovation to create competent engineering professionals with values and ethics.

MISSION

- ➤ Imparting Knowledge through implementing modern curriculum, academic flexibility and learner centric teaching methods in Electrical Engineering.

- ➤ Inspiring students for aptitude to research and innovation by exposing them to industry and societal needs to creating solutions for contemporary problems.

- ➤ Honing technical and soft skills for enhanced learning outcomes and employability of students with diverse background through comprehensive training methodologies.

- ➤ Inculcate values and ethics among students for a holistic engineering professional practice.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (EEE) Program will be:

1. Enrolled in academic program in the disciplines of electrical engineering, multidisciplinary areas and management studies.
2. Become entrepreneurs or be employed as productive and valued engineers in reputed industries.
3. Engage in lifelong learning, career enhancement and adopt to changing professional and societal needs.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (EEE) 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.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
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.
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.
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.
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.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.

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.

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.

PROGRAM SPECIFIC OUTCOMES

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

PSO1: **Plan** to **conserve and harness** electrical energy using electrical and electronic systems for **sustainability**.

PSO2: Use domain specific **tools** to **analyze, design and develop** electrical and electronic systems for feasible operation and control of Electrical and Electronic Systems.

PSO3: Develop **operating strategies** for utilization of energy and **application** of Electrical and Electronics systems in relevance to industry and society.

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	40	Internal Evaluation		Shall be evaluated as given in 12.2.4

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
	courses				
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 25credits 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**: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Chairman, Academic Council, SVEC (Autonomous).

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

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

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

Awarding of Division

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

21. **Additional Academic Regulations:**

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

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

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

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

22.   Withholding of Results:

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

23. 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.

**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 sheet or takes out or arranges to send out the question paper during the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared

	or answer book or additional sheet, during or after the examination.	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.

SVEC-19 CURRICULUM

Course Structure for B.Tech (EEE) Program
(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

ELECTRICAL AND ELECTRONICS ENGINEERING

I B.Tech.– I Semester

Sl. 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.	19BT1BS01	Differential Equations and Multivariable Calculus	3	1	-	4	4	40	60	100
2.	19BT1BS02	Biology for Engineers	2	-	-	2	2	40	60	100
3.	19BT1BS03	Engineering Physics	3	-	-	3	3	40	60	100
4.	19BT10341	Basic Civil and Mechanical Engineering	3	-	-	3	3	40	60	100
5.	19BT10201	Basic Electrical and Electronics Engineering	3	-	-	3	3	40	60	100
6.	19BT1BS31	Engineering Physics Lab	-	-	2	2	1	50	50	100
7.	19BT10231	Basic Electrical and Electronics Engineering Lab	-	-	2	2	1	50	50	100
8.	19BT20331	Engineering Workshop	-	-	2	2	1	50	50	100
			14	1	6	21	18	35	450	800
9.	19BT1AC01	Spoken English	2	-	-	2	-	-	-	-

I B.Tech.- II Semester

Sl. 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.	19BT2BS01	Transformation Techniques and Linear Algebra	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.	19BT20201	Electric Circuits	3	1	-	4	4	40	60	100
6.	19BT1BS32	Engineering Chemistry Lab	-	-	2	2	1	50	50	100
7.	19BT1HS31	Communicative English Lab	-	-	2	2	1	50	50	100
8.	19BT10331	Computer Aided Engineering Drawing	-	1	2	3	2	50	50	100
9.	19BT10531	Programming for Problem Solving Lab	-	-	2	2	1	50	50	100
10.	19BT20231	Electric Circuits Lab	-	-	2	2	1	50	50	100
		Total:	15	4	10	29	24	450	550	1000

II B.Tech.– ISemester

Sl. 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.	19BT3BS02	Special Functions and Complex Analysis	3	1	-	4	4	40	60	100
2.	19BT30402	Electronic Devices and Circuits	3	-	-	3	3	40	60	100
3.	19BT30201	Electrical Machines-1	3	1	-	4	4	40	60	100
4.	19BT30202	Electromagnetic Fields	3	-	-	3	3	40	60	100
5.	19BT30203	Signals and Networks	3	-	-	3	3	40	60	100
6.	19BT3HS31	Soft Skills Lab	-	-	2	2	1	50	50	100
7.	19BT30432	Electronic Devices and Circuits Lab	-	-	2	2	1	50	50	100
8.	19BT30231	Electrical Machines-1 Lab	-	-	2	2	1	50	50	100
9.	19BT30232	Signals and Networks Lab	-	-	2	2	1	50	50	100
		Total:	15	2	8	25	21	400	500	900
10.	19BT3MC01	Environmental Science	2	-	-	2	-	40	-	40

II B.Tech.– II Semester

Sl. 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.	19BT40441	Analog Electronics	3	-	-	3	3	40	60	100
2.	19BT40201	Digital Electronics	3	-	-	3	3	40	60	100
3.	19BT40202	Electrical Machines-2	3	1	-	4	4	40	60	100
4.	19BT40203	Electrical Measurements	3	-	-	3	3	40	60	100
5.	19BT40204	Transmission and Distribution	3	-	-	3	3	40	60	100
6.	**Open Elective-1**		3	-	-	3	3	40	60	100
7.	19BT40231	Digital Electronics Lab	-	-	2	2	1	50	50	100
8.	19BT40232	Electrical Engineering Workshop	-	-	2	2	1	50	50	100
9.	19BT40233	Electrical Machines-2 Lab	-	-	2	2	1	50	50	100
		Total:	**18**	**1**	**6**	**25**	**22**	**390**	**510**	**900**
10.	19BT315AC	Design Thinking	2	-	-	2	-	-	-	-

III B.Tech.– I Semester

Sl. 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.	19BT40403	Linear and Digital IC Applications	3	-	-	3	3	40	60	100
2.	19BT50201	Control Systems	3	-	-	3	3	40	60	100
3.	19BT50202	Switchgear and Protection	3	-	-	3	3	40	60	100
4.	**Professional Elective–1**									
	19BT50203	Electrical Machine Design	3	-	-	3	3	40	60	100
	19BT50204	Energy Systems								
	19BT50205	Instrumentation								
	19BT50206	PIC Microcontrollers								
5.	**Open Elective-2**		3	-	-	3	3	40	60	100
6.	**Inter Disciplinary Elective-1**									
	19BT50442	Principles of Communications	3	-	-	3	3	40	60	100
	19BT71002	PLC and SCADA								
	19BT51041	Sensors and Signal Conditioning								
	19BT50207	Computer Organization and Architecture								
7.	19BT61531	Internet of Things (IoT) Lab	-	1	2	3	2	50	50	100
8.	19BT40433	Linear and Digital IC Applications Lab	-	-	2	2	1	50	50	100
9.	19BT50231	Socially Relevant Project-1	-	-	-	-	1	50	50	100
		Total:	**18**	**1**	**4**	**23**	**22**	**390**	**510**	**900**
10.	19BT503AC	Foundations of Entrepreneurship	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**

III B.Tech.– II Semester

Sl. 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.	19BT60201	Power Electronics	3	-	-	3	3	40	60	100
3.	19BT60202	Power System Analysis	3	-	-	3	3	40	60	100
4.	**Professional Elective-2**									
	19BT60203	Advanced Control Systems	3	-	-	3	3	40	60	100
	19BT60204	Digital Signal Processing for Electrical Engineering								
	19BT60205	Energy Audit Conservation and Management								
	19BT60206	High Voltage Engineering								
5.	**Professional Elective-3**									
	19BT50403	VLSI Design	3	-	-	3	3	40	60	100
	19BT60207	Design and Estimation of Electrical Systems								
	19BT60208	Distributed Generation and Microgrid								
	19BT60209	Smart Grid Technology								
6.	**Inter Disciplinary Elective-2**									
	19BT50406	FPGA Architectures and Applications	3	-	-	3	3	40	60	100
	19BT60407	Image Processing								
	19BT61003	Industrial Data Communication								
	19BT50408	Microelectromechanical Systems								
7.	19BT60231	Electrical CAD Lab	-	-	2	2	1	50	50	100
8.	19BT60232	Power Systems–1 Lab	-	-	2	2	1	50	50	100
9.	19BT60233	Socially Relevant Project-2	-	-	-	-	1	50	50	100
		Total:	**18**	**0**	**4**	**22**	**21**	**390**	**510**	**900**
10.	19BT5MC01	Universal Human Values	**2**	**-**	**-**	**2**	**-**	**40**	**-**	**40**

Sl. 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.	19BT6HS02	Organizational Behavior	3	-	-	3	3	40	60	100
2.	19BT70201	Power System Operation and Control	3	-	-	3	3	40	60	100
3.	19BT70202	Solid State Drives	3	-	-	3	3	40	60	100
4.	**Professional Elective–4**		3	-	-	3	3	40	60	100
	19BT70401	Embedded Systems								
	19BT70203	Analysis of Power Electronic Converters								
	19BT70204	Electric Vehicles								
	19BT70205	Power System Automation								
5.	**Professional Elective–5**		3	-	-	3	3	40	60	100
	19BT70206	HVDC and FACTS								
	19BT70207	Power Electronics for Renewable Energy Systems								
	19BT70208	Soft Computing Techniques								
	19BT70209	Special Electrical Machines								
6.	19BT7MOOC	MOOC	-	-	-	-	3	-	100	100
7.	19BT70231	Power Electronics and Drives Lab	-	-	2	2	1	50	50	100
8.	19BT70232	Power Systems–2 Lab	-	-	2	2	1	50	50	100
9.	19BT70233	Internship	-	-	-	-	2	--	100	100
		Total:	**15**	**0**	**4**	**19**	**22**	**300**	**600**	**900**
10.	19BT702AC	Probability and Statistics	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**

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

Sl. 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.	19BT80231	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 PROGRAM

IN

ELECTRIC VEHICLES

Semester	Course Code	Course Title	Minor/ Honors	Contact Periods per week				Credits (C)	Scheme of Examination Max. Marks		
				L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
III-I	19BT50209	Fundamentals of Power Electronics and Drives	M	3	-	-	3	3	40	60	100
	19BT50210	PropulsionMachines in Electric Vehicles	M/H	3	-	-	3	3	40	60	100
	19BT50342	Vehicle Dynamics	M/H	3	-	-	3	3	40	60	100
	19BT50232	Power Electronics Lab	M	-	-	2	2	1	50	50	100
III-II	19BT60210	Controllers for Power Electronic and Drive Systems	M	3	-	-	3	3	40	60	100
	19BT60211	Energy Storage Devices	M/H	3	-	-	3	3	40	60	100
	19BT60212	Switched Mode Power Supplies	M/H	3	-	-	3	3	40	60	100
	19BT60234	Finite Element Analysis for Propulsion Motor Lab	M/H	-	-	2	2	1	50	50	100
IV-I	19BT70210	Advanced Electric Drives	M/H	3	-	-	3	3	40	60	100
	19BT70211	Energy Management and Optimization Techniques	M/H	3	-	-	3	3	40	60	100
	19BT70212	Intelligent Controllers for Electric Vehicles	M/H	3	-	-	3	3	40	60	100
	19BT70234	Control of Electric Vehicles Lab	M/H	-	-	2	2	1	50	50	100

Note: If the student has already pursued a course from the above list in their curriculum then he/she is NOT eligible to opt for the same in Minor/Honor Degree.

Honors – 6T + 2L (20 Credits)

Minor – 5T + 3L (18 Credits)

(19BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE & IT)

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

PRE-REQUISITES: -

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

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

CO1. Formulate and solve differential equations by applying knowledge ofcalculus 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)- Applications.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech - I Semester

(19BT1BS02) BIOLOGY FOR ENGINEERS

(Common to EEE, ECE & EIE)

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

Topics for Self-study are provided in the Lesson Plan.

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. - I Semester

(19BT1BS03) ENGINEERING PHYSICS
(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials

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

CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.

CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.

CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.

CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.

CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

DETAILED SYLLABUS:

UNIT-I: WAVE OPTICS (9 periods)

Interference: Principle of superposition - Interference of light - Theory of interference fringes - Conditions for sustained interference - Interference in thin films (reflected light) - Newton's rings - Determination of wavelength.

Diffraction: Fraunhofer diffraction - Single slit diffraction - Diffraction grating - Grating spectrum - Determination of wavelength.

Polarization: Polarization by reflection, refraction and double refraction - Nicol's prism - Half wave and Quarter wave plate - Engineering applications of interference, diffraction and polarization.

UNIT-II: ELECTROMAGNETIC WAVES AND FIBER OPTICS (10 periods)

Divergence, Curl of Electric and Magnetic Fields - Maxwell's Equations (qualitative)- Electromagnetic wave propagation (conducting and non conducting media).

Introduction to fiber optics - Total Internal Reflection - Critical angle of propagation - Acceptance angle, Acceptance cone - Numerical Aperture - Classification of fibers based

on Refractive index profile, modes - Attenuation losses - Dispersion - Propagation of electromagnetic wave through optical fiber - Block diagram of fiber optic communication - Applications of an optical fiber - Fiber optic Sensors (temperature, displacement).

UNIT-III: SEMICONDUCTORS   (10 periods)

Origin of energy bands - Classification of solids based on energy bands - Intrinsic semiconductors - Density of electrons in intrinsic semiconductor - Density of holes in intrinsic semiconductor (qualitative) - Intrinsic carrier concentration - Fermi energy - Electrical conductivity of intrinsic semiconductors - Extrinsic semiconductors - Density of charge carriers in n-type - Density of charge carriers in p-type (qualitative) - Direct and Indirect band gap semiconductors - Hall effect, Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - pn junction - Semiconducting materials for optoelectronic devices : Photodiode and Semiconductor diode laser.

UNIT-IV: DIELECTRICS AND MAGNETISM   (9 periods)

Introduction to dielectrics - Electric polarization - Dielectric polarizability, susceptibility and dielectric constant - Types of polarizations (qualitative) - Frequency dependence of polarization - Lorentz (internal) field - Dielectric break down - Piezoelectricity - Applications of dielectrics.

Introduction to magnetics - Magnetic dipole moment, magnetization, magnetic susceptibility and permeability - Origin of magnetic moment - Classification of magnetic materials - Hysteresis loop - Soft and hard magnetic materials.

UNIT-V: SUPERCONDUCTORS AND NANOMATERIALS   (7 periods)

Introduction to Superconductors, Properties - Critical parameters of Superconductors - Meissner effect - Penetration depth - Types of Superconductors - BCS Theory - Josephson effect (AC & DC) - High T_C Superconductors - Applications.

Basic principles of nanomaterials - Synthesis of nanomaterials by PLD method - Properties of nanomaterials (Electrical, Magnetic, Optical and Mechanical) - Applications of nanomaterials.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. M.N. Avadhanulu, P.G.Kshirsagar & T.V.S Arun Murthy, *A Text book of Engineering Physics*, S. Chand Publications, 11th edition, 2019.

2. P. K. Palaniswamy,*Engineering Physics*, Scitech Publications India Private Limited, 2ndedition, 2009.

REFERENCE BOOKS:

1. K. Thyagarajan, *Engineering Physics*, McGraw-Hill Education (India) Pvt. Ltd, 2016.

2. R.K. Gaur and S.L. Gupta, *Engineering Physics*, Dhanpat Rai Publications (P) Ltd, 2015.

I B.Tech – I Semester
(19BT10341) BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

COURSE OUTCOMES: After successful completion of the course, students will be able to
CO1. Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.
CO2. Describe the working of principles of basic mechanical engineering and solve problems related to it.

DETAILED SYLLABUS:
Part – A: CIVIL ENGINEERING
UNIT–I: SURVEYING AND CIVIL ENGINEERING MATERIALS   (10 Periods)
Overview of Civil Engineering: Civil Engineering contributions to the welfare of society, specialized sub disciplines in Civil Engineering.
Surveying: Objectives, classification and principles; Measurements – distances, angles, levels, areas and volumes; contouring; Illustrative examples.
Civil Engineering Materials: Bricks, stones, concrete, steel, glass, timber, composite materials.
Mechanics of Materials: Forces, system of forces, laws of mechanics ,moment of a force, equilibrium, resultant, Internal and External forces, Stress, Strain, Hooke's law and Elasticity.

UNIT–II: BUILDING COMPONENTS AND CIVIL ENGINEERING INFRASTRUCTURE
(8 Periods)

BUILDING COMPONENTS:
Sub structure - Types of foundations, Bearing capacity and settlement, Requirement of good foundations.

Superstructure - Civil engineering construction - Brick masonry, Stone masonry, Beams, Columns, Lintels, Roofs, Floors, Stairs, Building bye-laws - bye-laws floor area, carpet area and floor space index, basics of interior design and landscaping.

Civil Engineering Infrastructure - Types of Bridges and Dams, Water supply and Sanitary systems, Rainwater harvesting, Types of Highways and Railways, Ports and Harbours.

Part – B: MECHANICAL ENGINEERING
UNIT–III: INTERNAL COMBUSTION ENGINES, TURBINES AND PUMPS

(9 Periods)

Overview of Mechanical Engineering: Introduction to Mechanical Engineering, specialized sub disciplines in Mechanical Engineering.

Internal Combustion Engines - Classification – Working principle of Petrol and Diesel Engines – Four stroke and two stroke engines – Comparison of four stroke and two stroke engines.

Turbines and Pumps – Classifications of Steam turbines - Impulse turbine, Reaction turbines; Working principle of Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps.

UNIT–IV: MECHANICAL POWER TRANSMISSION SYSTEMS   (9 Periods)
Power Transmission Systems: Belt, rope and chain drives, Gears and Transmission screw

Power transmission by belts: Classification of belts, Length of the Belt (Open and Crossed-Belt Drives), Power Transmitted by Belt Drive, Tension due to Centrifugal Forces, Initial Tension, Maximum Power Transmitted.

Power transmission by Gear train: Gear terminology, Classification of gears, Gear train- Simple Gear Train and Compound Gear Train, Power Transmitted by Simple Gear Train.

UNIT–V: MANUFACTURING PROCESSES   (9 Periods)
Manufacturing processes: Elementary ideas of Casting, Forging, Rolling, Welding, Soldering and Brazing.

Machining processes- Lathe-Turning, Taper turning, Thread cutting, Shaping, Drilling, Grinding, Milling (simple sketches and short notes).

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXTBOOKS:

1. Shanmugam G and Palanichamy MS, *Basic Civil and Mechanical Engineering*, Tata McGraw Hill PublishingCo.,NewDelhi, 1stedition 2018.

2. R. Vaishnavi, Prof. M. Prabhakaran & Prof. V. Vijayan, *Basic Civil and Mechanical Engineering*, S.CHAND Publications, 2ndedition, 2013.

3. B.C Punmia, Ashok Kumar Jain, Arun kumar Jain, *Surveying (vol-I),* Laxmi publications, 16th edition, 2005.

4. B.C Punmia, Ashok Kumar Jain, Arun kumar Jain, *Building Construction,* Laxmi publications, 10th edition, 2008.

REFERENCES:

1. Seetharaman S., *Basic Civil Engineering*, Anuradha Agencies, 2005.

2. Ramamrutham S., *Basic Civil Engineering*, Dhanpat Rai Publishing Co.(P) Ltd.1999.

3. Kalpakjian, Serope, *Manufacturing Engineering and Technology,* Pearson Education, 7thedition, 2014.

4. Prabhu.T.J, Jai Ganesh. V and Jebaraj.S, *Basic Mechanical Engineering*, Scitech Publications, Chennai, 2000.

5. Pravin Kumar, *Basic Mechanical Engineering* Pearson Education, 1stedition, 2013.

I B. Tech. – I Semester

(19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: --

COURSE DESCRIPTION: 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

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech. - I Semester
(19BT1BS31) ENGINEERING PHYSICS LAB
(Common to EEE, ECE & EIE)

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

PRE - REQUISITES: --

COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil

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

CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.

CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.

CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.

CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.

CO5. Work independently and in teams to solve problems with effective communication.

List of Engineering Physics Experiments:

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

1. Determine the thickness of the wire using wedge shape method.
2. Determination of wavelength of light source by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Estimation of magnetic field along the axis of a circular coil carrying current.
5. Study the variation of Magnetic field induction (B) vs Magnetic field strength (H) by magnetizing the magnetic material (B-H Curve).
6. Determination the numerical aperture of a given optical fiber and hence to estimate its acceptance angle.
7. Determination of number of charge carriers and Hall coefficients of a given semiconductor using Hall Effect.
8. Determine the resistivity of semiconductor by Four probe method.

9.   Determine the energy gap of a semiconductor.

10.   Study the I-V characteristics of pn junction diode.

11.   Estimation of threshold voltages of different LED's.

12.   Study the characteristics of Photodiode.

13.   Determination of wavelength of laser by using diffraction grating.

REFERENCES:

1.   S. Balasubramaniah and M.N. Srinivasan, *A Text book of practical physics*, S Chand Publications, 2017.

2.   http://vlab.amrita.edu/index.php - Virtual Labs, Amrita University.

I B. Tech. – I Semester

(19BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: Physics at intermediate level.

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

COURSE OUTCOMES: After successful completion of the course, students 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 Godown 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/

7. https://nptel.ac.in/courses/117107094/

I B. Tech. – I Semester
(19BT20331) ENGINEERING WORKSHOP
(Common to ECE, EEE & EIE)

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:

Student shall perform any **Twelve Exercises**

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

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. – I Semester
(19BT1AC01) SPOKEN ENGLISH
(Audit Course)

(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: -

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;Just a Minute; **Listening – Speaking:** Do's and Don'ts; **Expressing:** Ability/ Admiration/ Agreement/ Anger/ Annoyance/ Appreciation/ Pleasure/ Sarcasm/ Satisfaction/ Surprise/ Approval/ Capability/ Certainty/ Condolences/ Doubt/ Fear/ Gratitude/ Possibility/ Worry; **Asking for:** Advice/ Clarification/ Direction/ Information/ Permission/ Predictions/ a recommendation

UNIT-II: VOCABULARY BUILDING: (6 periods)

Vocabulary for day-to-day conversations; Introduction: 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)

English Grammar and the Indian Student; Introduction: Parts of Speech, Verb forms; Tenses; Voice; Speech

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

Universal Auxiliaries; Sentence making for an effective communication; 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 terms; Useful daily expressions; Courtesy, Good manners and Etiquette; Conversation Techniques; Narrating/ Reading/ Listening to stories; Telling 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/

I B. Tech. - II semester

(19BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to EEE, ECE, EIE, CE, ME, CSE, CSSE & IT)

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

PRE-REQUISITES: -

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

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

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

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

DETAILED SYLLABUS:

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

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

UNIT-II: Laplace Transforms   **(9 Periods)**

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

UNIT- III: Inverse Laplace Transforms   **(9 Periods)**

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

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

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

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

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

                                                  Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

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

(19BT1BS04) ENGINEERING CHEMISTRY

(Common to EEE, ECE & EIE)

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, de fluoridation method – Nalgonda method; merits and demerits of various de fluoridation 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

Topics for Self-study are provided in the Lesson Plan

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. – II Semester
(19BT1HS01) COMMUNICATIVE ENGLISH
(Common to EEE, ECE & EIE)

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 by 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

Topics for Self-study are provided in the Lesson Plan

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. – II Semester
(19BT10501) PROGRAMMING FOR PROBLEM SOLVING
(Common to EEE, ECE & EIE)

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

Topics for Self-study are provided in the Lesson Plan

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. – II Semester

(19BT20201) ELECTRIC CIRCUITS
(EEE)

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

PRE-REQUISITES: Physics at Intermediate Level.

COURSE DESCRIPTION: Circuit reduction and analyzing techniques; Analysis of single and poly phase circuits; Circuit theorems; Magnetically coupled circuits and Two-Port networks.

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

CO1. analyze the electrical circuits by applying the principles of network reduction techniques, mesh and nodal analysis.

CO2. analyze the single and poly phase circuits to investigate the response and to determine various electrical quantities.

CO3. analyze various electrical circuits, by applying circuit theorems to determine the response for AC and DC excitations.

CO4. analyze coupled circuits by applying the principles of electromagnetism and determine various parameters.

CO5. design an appropriate filter network for the given specifications.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF ELECTRIC CIRCUITS (9 Periods)

Basic definitions of network, circuit, node, branch and loop; network reduction techniques-series, parallel, series-parallel circuits, current division and voltage division rules; source transformation, wye-to-delta and delta-to-wye transformations; nodal analysis and super node concept, mesh analysis and super mesh concept – numerical problems with dependent and independent AC & DC sources.

UNIT-II: ANALYSIS OF SINGLE PHASE AND THREE PHASE AC CIRCUITS

(12 Periods)

Peak factor and form factor for different wave forms; Analysis of single phase AC circuits: impedance and admittance, impedance triangle; Power triangle; Sinusoidal

response of R, L and C elements with different combinations; Resonance, bandwidth and quality factor for series and parallel networks.

Analysis of three phase balanced and unbalanced systems; Measurement of active and reactive power in balanced and unbalanced systems-single wattmeter and two wattmeter methods.

UNIT-III: CIRCUIT THEOREMS   **(10 Periods)**

Superposition, Thevenin's, Norton's, Maximum power transfer, Millmann's, Telligen's, Compensation and Reciprocity theorems for DC & AC Excitations (without proof); Concept of dual and duality – Numerical problems.

UNIT-IV: MAGNETICALLY COUPLED CIRCUITS   **(6 Periods)**

Coupled circuits-self and mutual inductance, coefficient of coupling, DOT convention; series and parallel connection of coupled coils, equivalent circuits of coupled coils; energy in coupled circuit; analogy between electrical and magnetic circuits.

UNIT-V: PASSIVE FILTERS   **(8 Periods)**

Classification of filters, filter networks, analysis of filter networks - attenuation, phase shift, characteristic impedance in pass band and stop band, constant-K low pass & high pass filters, m-derived filters, band pass & band elimination filters. Design of filters.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan.

TEXT BOOKS:

1. Charles K. Alexander, Mathew N O Sadiku, *Fundamentals of Electric Circuits*, 5th edition, McGraw Hill Education (India) Private Limited, NewDelhi, 2013.

2. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks Analysis and Synthesis*, 5th edition, McGraw Hill Education (India) Private Limited, NewDelhi, 2015.

REFERENCE BOOKS:

1. J. A. Edminister, M. D. Nahvi, *Theory and Problems of Electric Circuits*, 4th edition, Schaum's outline series, McGraw Hill, New Delhi, 2004.

2. W. H. Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, 8th edition, McGraw Hill, New Delhi, 2008.

I B.Tech. - II Semester

(19BT1BS32) ENGINEERING CHEMISTRY LAB

(Common to EEE, ECE & EIE)

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.

LIST OF EXPERIMENTS:

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

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. - II Semester

(19BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to EEE, ECE & EIE)

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.

List of Exercises:

*First Ten exercises are mandatory among the following:

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 - 3rdedition
10. Centro nix – 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. – II Semester

(19BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to EEE, ECE & EIE)

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

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. – II Semester
(19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to EEE, ECE & EIE)

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
(19BT20231) ELECTRIC CIRCUITS LAB
(EEE)

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 DC, single and poly phase circuits, Circuit theorems, magnetically coupled circuits and Two-Port networks.

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

CO1. analyze various electrical circuits by applying the principles of network reduction techniques, mesh and nodal analysis.

CO2. analyze the single, poly phase and coupled circuits to investigate the response and to determine various electrical quantities.

CO3. analyze various electrical circuits, by applying circuit theorems to determine the response for DC and AC excitations.

CO4. design an appropriate filter network for the given specifications.

CO5. work independently / in groups, and communicate effectively in oral and written forms.

List of Experiments:

Minimum **Ten** experiments are to be conducted.

1. Analysis of Series and Parallel circuits.
2. Mesh and nodal analysis.
3. Analysis of RL, RC and RLC circuits.
4. Current locus diagram of RL and RC circuits.
5. Analysis of Series and Parallel resonance.
6. Measurement of active and reactive power in three phase circuits.
7. Verification of Superposition and Reciprocity theorems.
8. Verification of Thevenin's and Norton's theorem.
9. Verification of Maximum Power transfer theorem for DC & AC excitations.
10. Determination of self and mutual inductance and coefficient of coupling.
11. Design and analysis of Low pass filter.
12. Design and analysis of High pass filter.

REFERENCE 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, 1stedition, 2001.

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, *Virtual Electric Circuits Lab*, A initiative of MHRD under NMEICT.

2. https://nptel.ac.in/courses/117106108/

3. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/

(19BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: Differential equations and Multivariable calculus

COURSE DESCRIPTION: Special Functions (Beta and Gamma functions); Special Functions (Bessel's and Legendre's equations); Analytic Functions; Conformal Mapping; Complex Integration; Residue Theorem.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Apply the knowledge of special functions to evaluate improper integrals.
CO2. Analyze the behavior of functions through the knowledge of complex analysis and evaluate integrals on complex planes.

DETAILED SYLLABUS

UNIT-I: SPECIAL FUNCTIONS (Beta and Gamma Functions)   (7 Periods)
Beta and Gamma functions: Properties, Relationship between beta and gamma functions, Evaluation of integrals using beta and gamma functions.

UNIT- II: SPECIAL FUNCTIONS (Bessel's and Legendre's Equations)

(9 Periods)

Bessel's equation: Recurrence formulae for $J_n(x)$, Generating function for $J_n(x)$ (without proof), Orthogonality of Bessel functions; Legendre's equation: Legendre polynomials, Rodrigue's formula, Generating function for $P_n(x)$ (without proof), Recurrence formulae for $P_n(x)$.

UNIT- III: ANALYTIC FUNCTIONS AND CONFORMAL MAPPING   (11 Periods)
Differentiation, analytic functions, Cauchy-Riemann equations (both Cartesian and polar), harmonic functions, harmonic conjugate, potential functions; Conformal

mapping: Definition and examples, Translation, Rotation, Inversion, Transformations $w = z^2, e^z$; Bilinear transformation and their properties.

UNIT-IV: COMPLEX INTEGRATION   (8 Periods)

Line integrals, Cauchy's theorem (without proof), Cauchy's integral formula (without proof), Generalized Cauchy's integral formula (without proof); Taylor's series, Laurent's series; zeros of an analytic functions, Singularities: Types of singularities, pole of order n.

UNIT-V: RESIDUE THEOREM   (10 Periods)

Residues and evaluation of residues at poles, Cauchy's Residue theorem (without proof), evaluation of integrals using residue theorem, evaluation of improper and real integrals

of the type: (i) $\int\limits_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int\limits_{-\infty}^{\infty} f(x)dx$ iii) $\int\limits_{-\infty}^{\infty} e^{imx} f(x)dx$.

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, *Text book of Engineering Mathematics, Vol-III*, S. Chand & Company, 9th edition, 2012.

2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

REFERENCE BOOKS:

1. J. W. Brown and R. V. Churchill, *Complex Variables and Applications,* Mc-Graw Hill, 7th edition, 2004.

2. N. P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, Reprint, 2010.

II B. Tech. – I Semester
(19BT30402) ELECTRONIC DEVICES AND CIRCUITS
(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Differential Equations and Multivariable Calculus & Engineering Physics.

COURSE DESCRIPTION:

Linear and Non-Linear Wave shaping, Biasing and small signal analysis of BJT & FET, Operation and characteristics of Special Purpose electronic devices.

COURSE OUTCOMES:

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

CO1. Analyze the response of High pass circuits, Low pass RC circuits for various signals and performance of clippers and clampers.

CO2. Design transistor biasing circuits and stabilize the operating point using appropriate techniques.

CO3. Develop mathematical model of BJT for CE, CB and CC configurations using h-parameters.

CO4. Analyze various configurations and biasing techniques for FET.

CO5. Demonstrate the operation and characteristics of special purpose semiconductor devices for real time applications.

DETAILED SYLLABUS:

UNIT-I: LINEAR& NONLINEAR WAVE SHAPING   (Periods: 09)
High-pass, Low-pass RC circuits, their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. High pass RC network as a Differentiator, Low pass RC network as an Integrator,Diode clippers and Clampers.

UNIT-II: TRANSISTOR BIASING & STABILISATION   (Periods: 10)
DC Load Line analysis and Selection of Q point, Biasing Circuits-Fixed(Base) Bias, Collector-to-Base Bias, Base Bias and collector-to-Base Bias with Emitter Resistor,Voltage Divider Bias Circuit, Thermal stability of Bias circuits, compensation techniques using Thermistor, Sensistor and Diode.

UNIT-III: SMALL SIGNAL ANALYSISOF BJT   **(Periods: 09)**

Transistor modeling using h-Parameters, CE, CB and CC circuit analysis using h-parameters, Simplified hybrid model, Comparison of CB, CE and CC circuits, Analysis of CE amplifier with emitter resistance.

UNIT-IV: FIELD EFFECT TRANSISTOR   **(Periods:10)**

Construction, Operation and characteristics of JFET, Enhancement MOSFET & Depletion MOSFET, FET Biasing-Gate bias, Self bias, voltage divider bias, FET equivalent circuit, CS,CD and CG amplifiers, comparison of BJT & FET.

UNIT-V: SPECIAL PURPOSE ELECTRONIC DEVICES   **(Periods: 07)**

Tunnel Diode, Varactor Diode, Unijunction Transistor (UJT),UJT as Relaxation Oscillator, DIAC, TRIAC, Silicon Controlled Rectifier

                                        Total periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse Digital and Switching Waveforms,* TMH, 3rd edition,2011.

2. J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits*, TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. David A. Bell, *Electronic Devices and Circuits*, Oxford University press, 5th Edition, 2014

2. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*,TMH, 3rd Edition 2013.

3. R.L. Boylestad and Louis Nashelky, *Electronic Devices andCircuits*, PHI, 10thEdition, 2009.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/basic-electronics-prof-tsnatarajan.html

2. https://kupdf.net/download/n-n-bhargava-basic-electronics-and-linear-circuits_5912b54adc0d60a324959ea5_pdf

3. http://www.talkingelectronics.com/Download%20eBooks/Principles%20of%20electronics/CH-21.pdf

(19BT30201) ELECTRICAL MACHINES-1

(EEE)

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

PRE-REQUISITES:

Basic Electrical and Electronics Engineering and Electric Circuits.

COURSE DESCRIPTION:

Construction, operation, types, performance characteristics and applications of DC machines and transformers.

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

CO1. analyse the DC generator to evaluate various operating parameters and develop constructional features for sustainability.

CO2. analyse the operational characteristics of various DC generators to assess measures for sustainability.

CO3. analyse the performance characteristics of various types of DC motors to develop accessories and assess the suitability for industrial applications.

CO4. analyse the equivalent circuits of transformers with various configurations to determine their performance and assess sustainability for various load conditions.

DETAILED SYLLABUS:

UNIT-I: DC GENERATORS (9 Periods)

Principle of operation and constructional details of DC generator. Armature windings — lap and wave, simplex and multiplex, single layer and multi-layer, equalizer rings and dummy coils.EMF equation and methods of excitation. Losses — constant, variable and minimization of losses. Calculation of efficiency — condition for maximum efficiency.

UNIT-II: ARMATURE REACTION, COMMUTATION AND CHARACTERISTICS

(9 Periods)

Armature reaction — cross magnetizing and de-magnetizing AT/pole; compensating winding. Commutation — reactance voltage and methods of improving commutation. Build-up of EMF in a self-excited DC generator; causes for failure of self-excitation and

remedial measures. Internal and external characteristics of DC generators and applications.

UNIT–III: DC MOTORS **(9 Periods)**

Principle of operation of DC motor; Back EMF& its significance; speed and torque equation. Characteristics and applications of shunt, series and compound motors. Speed control of DC shunt and series motor. Electric braking; Starters for DC Motors (2-, 3- and 4-point) and their design.

UNIT–IV: SINGLE PHASE TRANSFORMERS **(10 Periods)**

Introduction — classification of transformers, cooling methods, ideal and practical transformers; operation on no-load and on-load, phasor diagrams; losses, equivalent circuit, efficiency and regulation; Effects of variation of frequency and supply voltage on iron losses. All-day efficiency. Auto transformers — equivalent circuit, comparison with two winding transformers.

UNIT-V: THREE-PHASE TRANSFORMERS **(8 Periods)**

Three-phase transformers — construction and connections — Y/Y, Y/Δ, Δ/Y, Δ/Δ, open-Δ and Scott connections. Three winding transformers — tertiary windings; determination of ZP, Zs and ZT;OFF-load and ON-load tap changing.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. JB Gupta, *Theory and performance of Electrical Machines* (DC machines, Poly phase Circuits & AC machines) in SI Units, S.K. Kataria & Sons, New Delhi, 15th edition, 2015.
2. R.K. Rajput, *Electrical Machines* in S.I. Units, Laxmi Publications (P) Ltd, 6th edition, New Delhi, 2017.

REFERENCE BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, 7th edition, Delhi, 2011.
2. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology(in S. I. Units)*, Vol.2, S. Chand & Company Ltd, Multicolour illustrative edition, New Delhi, 2014.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/electrical-machines-i.html
2. https://nptel.ac.in/courses/108/102/108102146/
3. https://freevideolectures.com/course/3085/electrical-machines-i

4. https://www.youtube.com/playlist?list=PL9RcWoqXmzaJpnkjoNleyFNgGk9-znOji

(19BT30202) ELECTROMAGNETIC FIELDS

(EEE)

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

PRE-REQUISITES:

Differential Equations and Multivariable Calculus, Engineering Physics.

COURSE DESCRIPTION:

Static electric fields; Gauss's law and its applications; Potential and Potential Gradient; steady magnetic fields; Ampere's circuital law and its applications; Force in magnetic fields; behaviour of various materials in electric and magnetic fields; Inductance and capacitance calculations; Maxwell's equations for time variant and time invariant fields.

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

CO1. analyse the static electric field to determine electric field for various charge configurations by applying the laws of electrostatics.
CO2. analyse the static magnetic field to determine magnetic field and force due to various current carrying elements by applying the laws of magneto statics.
CO3. analyse the time varying electric and magnetic fields by applying the laws of electromagnetic.

DETAILED SYLLABUS:

UNIT-I: ELECTROSTATICS - I   (12 Periods)

Introduction to electrostatic fields, coulomb's law in vector form, electric field intensity (EFI), EFI due to various charge distributions, electric flux density, Gauss's law, application of Gauss's law - symmetrical charge distributions, differential volume element, Maxwell's first equation in point and integral form. Energy expended in moving a point charge in an electric field, electric potential, potential for different charge distributions, potential gradient, Maxwell's second equation in point and integral form.

UNIT-II: ELECTROSTATICS – II   (10 Periods)

Electric Dipole, dipole moment, Potential and EFI due to an electric dipole. Current density, conduction and convection current density, Ohm's law in point form, current continuity equation, conductors and dielectric materials, properties, boundary conditions between conductor and dielectric material, two perfect dielectric materials, law of refraction, capacitance, capacitance of a parallel plate capacitor (with and without composite dielectric), energy density in electrostatic field, Poisson's and Laplace's equations.

UNIT-III: MAGNETOSTATICS   (09 Periods)

Introduction to Magnetic fields, relation between magnetic flux density and magnetic Field Intensity (MFI), Biot-Savart's law, MFI due to various current carrying elements, Ampere's Circuital law, Maxwell's third equation in point and integral form, applications of Ampere's Circuital law - infinite line current, infinite sheet of current, solenoid and toroid. Maxwell's fourth equation in point and integral form. Scalar magnetic potential and vector magnetic potential.

UNIT-IV: FORCE IN MAGNETIC FIELDS   (08 Periods)

Force due to magnetic fields, Lorentz force equation, force on a straight and long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors. Torque on a current loop placed in a magnetic field, magnetic dipole and magnetic dipole moment, magnetic boundary conditions between different magnetic materials. Self-inductance of a solenoid, toroid and co-axial cable, energy density in magnetic field.

UNIT-V: TIME VARYING FIELDS   (06 Periods)

Introduction to time varying fields, Faraday's laws of electromagnetic induction, statically and dynamically induced EMF, concept of displacement current, modifications of Maxwell's equations for time varying fields, Poynting theorem.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. William H. Hayt and John A. Buck, *Engineering Electromagnetics,* 8th edition, McGraw Hill Education (India)Pvt. Ltd. 2014.
2. Matthew N.O. Sadiku, *Principles of Electromagnetics,* 4th edition, Oxford University Press, New Delhi, 2007.

REFERENCE BOOKS:

1. Joseph A. Edminister, *Theory and Problems of Electromagnetics*, Schaum's Outline Series, Tata McGraw Hill Inc., New Delhi, 2009.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/108/104/108104087/

II B. Tech. – I Semester
(19BT30203) SIGNALS AND NETWORKS
(EEE)

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

PRE-REQUISITES:

Transformation Techniques and Linear Algebra and Electric circuits.

COURSE DESCRIPTION:

Discrete and continuous time signals; Signal transformation methods — circuit applications; Analysis of Transients and Two-port networks.

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

CO1. perform various operations on signals and evaluate their characteristics.
CO2. analyze spectral characteristics of signals and circuits using Fourier, Laplace and z-Transforms.
CO3. analyze transient behaviour of DC & AC circuits by using differential equations and Laplace transform methods.
CO4. Analyze network parameters of an isolated and interconnected two-port network.

DETAILED SYLLABUS:

UNIT-I: DISCRETE AND CONTINUOUS TIME SIGNALS (10Periods)
Continuous and discrete signals: Test signals — Unit step, ramp, parabolic, unit impulse and exponential signals; Basic operation on signals— Time and Amplitude scaling; Classification of Signals — Periodic and a periodic signals, Odd and even components, Energy and power signals.

UNIT-II: TRANSFORMATION OF SIGNALS: Fourier Transforms (08 Periods)
Fourier series: Review of Fourier series, Trigonometric Fourier Series, properties of Fourier series (Without proof), Fourier series of common signals — amplitude and phase spectrum, Circuit Applications — Average value, RMS Values, average power and response.
Fourier transforms— Definition, properties of Fourier transforms (Without proof); Fourier transform of periodic signals; inverse Fourier transform. Applications — Circuit analysis and Parseval's theorem.

UNIT-III: TRANSFORMATION OF SIGNALS: Laplace and z-Transforms

(10 Periods)

Laplace transforms: Review of Laplace transform, Laplace transform of periodic signals, properties of the Laplace transform(Without proof)—initial and final value theorems (without proof) and convolution, Region of convergence. Applications — Circuit analysis.

Z-Transforms:z-Transform, Region of convergence for the z-Transform, inverse z-Transform; Properties of the z-Transform—Initialand final value theorem (without proof) and convolution;Application: z-Transform solution of linear difference equations.

UNIT-IV: TRANSIENT ANALYSIS **(09Periods)**

DC Transients: Initial conditions; Transient response of RL, RC and RLC circuits.
AC Transients: Transient response of RL, RC and RLC circuits; solution methods using differential equation and Laplace transforms.

UNIT-V: TWO-PORT NETWORKS **(08Periods)**

Network Functions — Driving point and transfer functions; Network parameters — Impedance, Admittance, Transmission and Hybrid parameters. Symmetry and reciprocity property in two-port networks; Interrelationships of different parameters; Inter-connection of two-port networks.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. Lathi & Bhagw and as Pannalal, *Principles of Linear Systems and Signals,* Oxford University Press, 2ndedition, 2009.
2. Charles K. Alexander & Matthew N. O. Sadiku, *Fundamentals of Electric Circuits,* McGraw-Hill education Private Limited, New Delhi, 5thedition, 2013.

REFERENCE BOOKS:

1. Matthew N Sadiku, and Warsame Hassan Ali, *Signals and Systems: A Primer with MATLAB,* CRC Press, 2016.
2. A Chakrabarthi, *Network Analysis and Synthesis,* Dhanpat Rai & Co., New Delhi, 2nd revised edition, 2016.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/117/101/117101055/

2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/

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II B. Tech. – I Semester

(19BT3HS31) SOFT SKILLS LAB

(Common to CE, ME, EEE, ECE & EIE)

</div>

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.

List of Exercises:

*First TEN exercises are mandatory among the following:

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 Mc Graw-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
(19BT30432) ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: A Course on Basic Electrical and Electronics Engineering.

COURSE DESCRIPTION: Integrator and Differentiator, Clippers and Clampers, Transistor switch, h-parameter calculation, Drain and Transfer characteristics of FET, Frequency response of CE and CS amplifiers, UJT Relaxation oscillator, Characteristics of DIAC and SCR.

COURSE OUTCOMES:

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

CO1. Analyze the response of RC circuits for square input.

CO2. Analyze the characteristics of BJT, FET, DIAC and SCR.

CO3. Design BJT and FET Amplifiers and evaluate the performance parameters from the frequency response.

CO4. Develop the basic applications of diode, transistor and UJT for desired specifications.

CO5. Work independently and in teams to solve problems with effective Communication.

List of Exercises/List of Experiments:

(Minimum Ten Experiments are to be conducted)

1. Design RC integrator and differentiator and determine their response to the square input.
2. Develop clipper circuit to clip positive and negative portions of the input waveform with two reference voltages.
3. Develop clamping circuits to clamp different positive and negative dc levels of the input signal.
4. Verify the switching action of a BJT with suitable circuit.
5. Verify input and output characteristics of BJT in Common Base configuration experimentally and find required h – parameters from the graphs
6. Verify the frequency response of Common Emitter Amplifier.
7. Study and draw the Drain and Transfer Characteristics of a JFET experimentally.
8. Verify the Frequency Response of Common Source Amplifier using JFET.
9. Study and draw the V-I Characteristics of DIAC experimentally.
10. Study and draw the V-I Characteristics of SCR experimentally.

11. Design a Relaxation Oscillator using UJT.
12. Design and analyze any biasing circuit using BJT.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Navas K.A, Electronics Lab Manual (Volume 2), PHI Learning Private Ltd. 6th Edition, 2018.

SOFTWARE/Tools used: --

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, Basic Electronics Lab, An initiative of MHRD under NMEICT.

II B. Tech. – I Semester

(19BT30231) ELECTRICAL MACHINES-1 LAB

(EEE)

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

PRE-REQUISITES:

Basics of Electrical and Electronics Engineering Lab and Electric circuits.

COURSE DESCRIPTION:

Speed control and performance characteristics of DC Machines; Determination of losses and performance evaluation of DC machines and transformers.

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

CO1. evaluate the operating characteristics of DC generators and validate the practical observations with the underlying concepts.

CO2. evaluate the operating characteristics of DC motors and validate the practical observations with the underlying concepts.

CO3. realize the philosophy of testing procedures of various DC machines and transformers by adhering the code of conduct.

CO4. evaluate the operating characteristics of transformers and validate the practical observations with the underlying concepts.

CO5. work independently / in groups, and communicate effectively in oral and written forms.

Practical Exercises/List of Experiments:

Minimum **Ten** experiments are to be conducted.

1. OCC of DC shunt generator.
2. Load test on DC shunt generator.
3. Brake test on DC Shunt and Compound Motors.
4. Speed control of DC shunt motor.
5. Swinburne's test.
6. Hopkinson's test.
7. Electric braking of DC motor.
8. OC and SC tests on 1-Phase transformer.
9. Separation of core losses in a 1-Phase transformer.

10. Sumpner's test.

11. Parallel operation of1-Phase transformers.

12. Scott connection.

TEXT BOOKS:

1. JB Gupta, *Theory and performance of Electrical Machines*(DC machines, Poly phase Circuits & AC machines) in SI Units, S.K. Kataria & Sons, New Delhi, 15th edition, 2015.

2. R.K. Rajput, *Electrical Machines* in S.I. Units, Laxmi Publications (P) Ltd, 6th edition, New Delhi, 2017.

REFERENCE BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, Khanna Publishers, 7th edition, Delhi, 2011.

2. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology (in S. I. Units)*, Vol.2, S. Chand & Company Ltd, Multicolour illustrative edition, New Delhi, 2014.

ADDITIONAL LEARNING RESOURCES:

1. http://vlabs.iitb.ac.in/vlabsdev/vlab_bootcamp/bootcamp/Sadhya-/experimentlist.html

2. http://emcoep.vlabs.ac.in/List%20of%20experiments.html?domain=Electric-al%20Engineering

(19BT30232) SIGNALS AND NETWORKS LAB

(EEE)

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

PRE-REQUISITES:

Transformation techniques and linear algebra and Electric circuits.

COURSE DESCRIPTION:

Practical investigations through simulation on signals and systems; Spectral analysis of signals, and analysis of transients and two-port networks.

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

CO1. evaluate, analyze the characteristics/responses of various signals and systems, and interpret the practical observations for validation.

CO2. analyze spectral characteristics of signals/response in frequency domain using Fourier, Laplace and z-Transforms.

CO3. analyze transient behavior of DC & AC circuits using mathematical methods and design timer circuits for desired specifications.

CO4. analyze network parameters of an isolated and interconnected two-port networks and design impedance and gain matching networks.

CO5. work independently / in groups, and communicate effectively in oral and written forms.

Practical Exercises/List of Experiments:

Minimum Five experiments are to be conducted from each part.

PART-A:

1. Generation of continuous and discrete time signals.
2. Basic operations on continuous and discrete time signals — Time scaling and amplitude scaling.
3. Systems and their properties — Linearity, causality and stability.
4. Response of LTI systems for different excitations.
5. Analysis of signals — Amplitude and Phase spectrum.
6. Convolution in frequency domain — Laplace and z-transforms.

PART–B:

7. Transient response of RL circuit and design of timer circuit.
8. Transient response of RC circuit and design of timer circuit.
9. Transient response of RLC circuit and applications.
10. Determination of two-port network parameters in an isolated networks — Z, Y, ABCD and h-Parameters.
11. Determination of two-port network parameters in an interconnected networks — Series-Series, Parallel-Parallel and cascaded interconnections.
12. Design of impedance matching two-port network.

TEXT BOOKS:

1. Lathi & Bhagwandas Pannalal, *Principles of Linear Systems and Signals,* Oxford University Press, 2nd edition, 2009.
2. Charles K. Alexander & Matthew N. O. Sadiku, *Fundamentals of Electric Circuits,* McGraw-Hill education Private Limited, New Delhi, 5th edition, 2013.

REFERENCE BOOKS

1. Matthew N Sadiku, and Warsame Hassan Ali, *Signals and Systems: A Primer with MATLAB,* CRC Press, 2016.
2. Alex Palamides Anastasia Veloni, *Signals and Systems Laboratory with MATLAB*, CRC Press Taylor & Francis Group, 2011.

ADDITIONAL LEARNING RESOURCES:

1. http://ssl-iitg.vlabs.ac.in/
2. https://nptel.ac.in/courses/117/101/117101055/
3. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/

II B. Tech. – I Semester
(19BT3MC01) ENVIRONMENTAL SCIENCE
(Mandatory Course)

(Common to ECE, EEE & EIE)

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. Analyzesocial 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.

II B. Tech. – II Semester

(19BT40441) ANALOG ELECTRONICS
(EEE)

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

PRE-REQUISITES: Courses on Basic Electrical and Electronic Engineering & Electronic Devices and Circuits.

COURSE DESCRIPTION:

Demonstrate Single Stage Amplifiers; Multi Stage amplifiers; Frequency Response; Negative Feedback Amplifiers; Oscillators; Multi vibrators; Large Signal Amplifiers.

COURSE OUTCOMES:

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

CO1. Design multistage amplifiers using voltage divider bias to determine the Gain, Bandwidth, Input and Output Impedances.

CO2. Analyze the concept of feedback to improve the stability of amplifiers and generate sustained oscillations.

CO3. Realize different classes of Power Amplifiers to improve efficiency.

CO4. Design filters to find the frequency response and operate IC555 in various modes for different applications

DETAILED SYLLABUS:

UNIT-I: BJT AMPLIFIERS   (11 periods)

Classification of Amplifiers, Distortion in amplifiers, Analysis of Single Stage Common Emitter Amplifier- Frequency Response, Different coupling schemes used in multistage amplifiers, Effect of coupling and bypass capacitors on frequency response, Multistage Frequency Effects, Analysis of Two stage RC Coupled amplifier, Cascode amplifier, Darlington pair, Bootstrapped Darlington circuit, Hybrid- Pi (п)- Common Emitter model.

UNIT-II: NEGATIVE FEEDBACK AMPLIFIERS   (09 periods)

Classification of Amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics, Method of analysis of Feedback amplifier, Voltage series Feedback, Voltage shunt feedback, Current series feedback and Current shunt Feedback configurations.

UNIT-III: OSCILLATORS   **(08 periods)**

Conditions for oscillations, Classification, RC phase shift oscillator using BJT and FET, Wien bridge oscillator using BJT, Generalized analysis of LC oscillators, Hartley and Colpitts Oscillators, Crystal Oscillator, Frequency stability.

UNIT-IV: LARGE SIGNAL AMPLIFIERS   **(08 periods)**

Classification, Series fed Class A Power Amplifier- Power conversion Efficiency, Transformer Coupled class A power Amplifier, Push Pull and Complimentary Symmetry Class B power amplifier, Class AB operation, Principle of operation of class –C Amplifier, Transistor Power Dissipation, Heat Sinks.

UNIT-V: ACTIVE FILTERS AND 555 TIMER   **(09 Periods)**

Analog Filters: Introduction, RC Active Filters- first order and second order all pass, Low pass & high pass, Band pass and Band reject using Op-Amp.

IC 555 Timer: Introduction to 555 Timer, functional diagram, Monostable Operations, Astable operations & their applications.

                                                        Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias and Satyabrata Jit , *Integrated Electronics,* McGraw-Hill Education, 3nd edition, 2010.

2. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1998

REFERENCE BOOKS:

1. Adel S.Sedra, Kenneth C.Smith ,Micro Elctronic Circuits Theory and applications, OXFORD international student edition 5th edition, ,2009

2. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.

3. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 4thEdition, 2011.

II B. Tech – II Semester

(19BT40201) DIGITAL ELECTRONICS

(EEE)

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

PRE-REQUISITES:

Electronic Devices and Circuits.

COURSE DESCRIPTION:

Boolean algebra; Minimization techniques; Analysis of digital circuits; Asynchronous Sequential Logic, Programmable Memories and Computer arithmetic.

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

CO1. design logical circuits by analyzing various Boolean functions and simplification methods to perform desired logical operations using logical gates.

CO2. design combinational logical circuits for performing various arithmetic operations and data encoding and decoding in various data lines.

CO3. analyze various sequential circuits for realizing counters and registers using flip-flops.

CO4. analyze clocked sequential circuits using various techniques and realize design procedures for optimal circuits.

CO5. design programmable logic devices for required memory and develop various computer algorithms for arithmetic operations.

DETAILED SYLLABUS

UNIT-I: Boolean Algebra & Logic Gates   **(11 Periods)**

Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, the map method, four variable, Five variable K-map, POS& SOP Simplification, Don't care conditions.

Logic Gates: Logic operations & Logic gates, NAND & NOR Implementation, Other two level Implementation.

UNIT-II: Combinational Circuits   **(08 Periods)**

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers, Demultiplexers-1-Line to 4-Line and 1-Line to 8-LineDe-multiplexers.

UNIT-III: Sequential Circuits-I   **(09 Periods)**

Sequential Circuits, Latches, Flip-Flops, conversions, Clocked sequential circuits, Registers-Shift Registers, Counters- Synchronous counters and Asynchronous counters.

UNIT-IV: Sequential Circuits -II   **(08 Periods)**

Analysis of Clocked sequential circuits– Mealy & Moore circuits, design procedure, State Reduction & Assignment- partition technique, merger chart & merger table, Hazards.

UNIT-V: Programmable Memories&Computer Arithmetic   **(09 Periods)**

Programmable Memories: ROM,PLA, PAL.

Computer Arithmetic: Addition and Subtraction, Multiplication and Division Algorithms

                                                Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. A. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008.
2. M. Morris Mano, *Digital Design*, Pearson, 5th edition, 2013.

REFERENCE BOOKS:

1. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory*, Tata McGraw-Hill, 2nd Edition, 1978.
2. Charles H. Roth, *Fundamentals of Logic Design*, Thomson Publications, 5[th]edition, 2004.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/117/101/117101055/
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/

(19BT40202) ELECTRICAL MACHINES-2

(EEE)

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

PRE-REQUISITES:

Electrical Machines-1 and Electrical Machines-1 Lab.

COURSE DESCRIPTION:

Construction, types, operation and applications of induction machines and synchronous machines; parallel operation of synchronous generators; Performance evaluation of induction machines and synchronous machines.

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

CO1. analyze the performance of induction machine to evaluate the operating parameters and to asses feasible control strategies.

CO2. analyze the performance of synchronous generator to evaluate the operating parameters and to assess measures for sustainability.

CO3. analyze the synchronized operation of alternators and the effect of influencing factors on synchronization, and to determine feasible operating state for sustainability.

CO4. analyze the performance of synchronous motor to evaluate the operating parameters, and to determine sustainable and feasible operating states for various loadings.

DETAILED SYLLABUS:

UNIT-I: THREE PHASE INDUCTION MOTORS   (9 Periods)

Production of rotating magnetic field in 3-phase Induction motor, slip, rotor EMF and rotor frequency, rotor reactance, rotor current and power factor at standstill and running conditions; ratio of full-load torque and maximum torque, ratio of starting torque and maximum torque; losses in 3-phase induction motor, relation between rotor power input, rotor copper loss and mechanical power developed. Induction motor as a generalized transformer. Double-cage and deep bar rotors.

UNIT-II: STARTING AND SPEED CONTROL METHODS   (9 Periods)

Methods of starting — starting current and torque calculations for direct online, primary resistors, auto transformer and star-delta starters; Crawling and Cogging; Speed control — change of frequency, voltage and stator poles, rotor rheostat control, cascade connection and injection of EMF into rotor circuit. Induction generator — principle of operation and its applications.

UNIT-III: SYNCHRONOUS GENERATORS (10 Periods)

Armature windings — integral slot and fractional slot, distributed and concentrated, short pitch and full pitch, winding factors; EMF equation, harmonics in generated EMF and suppression of harmonics. Armature reaction and its effect for various operating power factors.— phasor diagrams; Power flow equations in synchronous generator. Salient pole alternators —two-reaction theory, phasor diagrams and voltage regulation.

UNIT-IV: PARALLEL OPERATION OF SYNCHRONOUS GENERATORS (10 Periods)

Conditions for parallel operation; methods of synchronization; Synchronizing current, power and torque, rigidity factor. Effect of change of excitation and mechanical power input on parallel operation of two alternators, load sharing between two alternators; Synchronous machines on infinite bus bars. Short Circuit Ratio (SCR) and its significance. Time period of rotor oscillations.

UNIT-V: THREE PHASE SYNCHRONOUS MOTORS (7 Periods)

Principle of operation; starting methods —auxiliary motor, damper winding, synchronous-induction motor. Phasor diagrams; Variation of armature current and power factor with excitation; synchronous condenser. Power flow equations in synchronous motor. Circle diagram —excitation and power circles. Hunting and its suppression.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, 7th edition, Khanna Publishers, New Delhi, 2011.
2. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase circuits & AC machines) in SI Units*, 15[th]edition,S.K. Kataria& Sons, New Delhi, 2015.

REFERENCE BOOKS:

1. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, 6th edition, McGraw-Hill, New Delhi, 2008.
2. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology in S. I. Units*, Vol.2, S.Chand Company Ltd, Multicolour edition, New Delhi, 2014.

II B. Tech. – II Semester

(19BT40203) ELECTRICAL MEASUREMENTS

(EEE)

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

PRE-REQUISITES: Electric Circuits.

COURSE DESCRIPTION:
Measurement of electrical quantities; construction, working, design and applications of various electrical measuring instruments; Performance evaluation of various electrical measuring instruments.

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

CO1. understand the constructional and operating principles of various measuring instruments and design an appropriate shunt and multiplier for the extension of instrument range.

CO2. analyze various errors, while measuring the electrical quantities due to interconnection of power, energy and power factor measuring instruments and assess the error compensation techniques.

CO3. analyze various errors, while measuring the electrical quantities due to interconnection of instrument transformers and potentiometers, and assess the error compensation techniques.

CO4. analyze the phasor of various electrical bridges used for measuring, to estimate various electrical quantities.

CO5. analyze the patterns of various monitoring instruments to determine the phase and frequency of various electrical signals.

DETAILED SYLLABUS:

UNIT-I: MEASUREMENT OF VOLTAGE AND CURRENT   (11 Periods)
Types of measuring instruments; Methods of measurements; Static characteristics — limiting and relative limiting errors and combination of quantities with limiting errors; Types of errors. PMMC and MI instruments — Construction, working, torque equation, extensions, errors, compensations, and advantages and disadvantages.

UNIT-II: MEASUREMENT OF POWER, ENERGY ANDPOWERFACTOR   (08 Periods)
Measurement of power: EDM wattmeter — construction, working, torque equation, shape of scale, errors and compensations; LPF wattmeter.

Measurement of energy: Single phase induction type energy meter — construction, working, driving and braking torques, lag adjustment devices, errors and compensations. Three phase energy meter.

Measurement of power factor: Power factor meter — single phase and three phase electrodynamometer type.

UNIT-III: INSTRUMENT TRANSFORMERS AND POTENTIOMETERS (10 Periods)

Current and Potential transformers — construction, working, phasor diagram, errors and characteristics; Measurement of power using instrument transformers,

DC Potentiometers: Basics lide wire potentiometer circuit, DC Crompton's potentiometer —principle, operation, standardization and applications.

AC Potentiometers: Polar and coordinate type potentiometers — Principle, operation, standardization and applications.

UNIT-IV: DC AND AC BRIDGES   (06 Periods)

Measurement of resistance: Wheatstone bridge-Sensitivity of Wheat stone's bridge, Kelvin's double bridge and loss of charge method.

Measurement of inductance & quality factor: Maxwell's inductance bridge, Hay's bridge, Anderson's bridge and Owens's bridge

M**easurement of capacitance & loss angle:** De-sauty's bridge, Schering bridge and modified Schering bridge.

Measurement of frequency: Wien's bridge.

UNIT-V: CRO AND DIGITAL INSTRUMENTS   (10 Periods)

Cathode ray oscilloscope: Introduction, cathode ray tube, time base generator, horizontal and vertical amplifiers, measurement of phase and frequency by Lissajous patterns.

Digital instruments: Digital voltmeters and types (ramp, integrating, successive approximation), Digital energy meter, Digital storage oscilloscope, Digital frequency meter, Digital multi-meters and Digital tachometer.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. A.K. Sawhney, A course on *Electrical and Electronics Measurements & Instrumentation*, Dhanpatrai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, A course on *Electrical and Electronics Measurements & Instrumentation*, S.K. Kataria publishers, 14[th]edition, 2014.

REFERENCE BOOKS:

1. H. S. Kalsi, *Electronic Instrumentation*, Tata MC Graw Hill Company, 3rd edition, 2010.
2. E.W. Golding and F.C. Widdis, *Electrical Measurements and measuring Instruments,* Reem Publications, 5th Edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/108/105/108105153/

II B. Tech. – II Semester
(19BT40204) TRANSMISSION AND DISTRIBUTION
(EEE)

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

PRE-REQUISITES:

Electromagnetic Fields, and Signals and Networks.

COURSE DESCRIPTION:

Parameters of overhead transmission lines and underground cables; Performance of transmission lines, travelling wave phenomenon; Insulators; Sag and corona; Distribution systems classification, analysis and planning.

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

CO1. analyze the overhead lines and underground cables to evaluate various parameters and their characteristics for different configurations.

CO2. analyze the performance of transmission lines and investigate the behaviour of travelling waves for different configurations of transmission lines.

CO3. analyze the mechanical and electrical aspects of overhead transmission lines and realize measures for sustainability.

CO4. analyze various distribution systems, to determine their performance characteristics under various scenarios.

CO5. realize various aspects of substation, and analyze the primary and secondary feeders systems of substation to configure the feeder layout in a service area.

DETAILED SYLLABUS:

UNIT-I: OVERHEAD TRANSMISSION LINE AND UNDERGROUND CABLES

(11 Periods)

Overhead Transmission Lines: Overhead line and underground cables and its types, Parameters- resistance, inductance and capacitance calculations in single and three phase transmission lines, single and double circuits, symmetrical and unsymmetrical spacing, concepts of GMR and GMD-Effect of earth on capacitance.

Underground Cables: Construction, types of insulating materials, classification of cables, laying of cables, insulation resistance, capacitance of single and 3-core belted cables, grading of cables - capacitance and inter sheath grading.

UNIT-II: ANALYSIS OF TRANSMISSION LINES   **(11 Periods)**

Modelling and Analysis of Transmission lines: Classification - short line, medium line and long line; equivalent circuits –end condenser, Nominal-T, Nominal-π models, rigorous method; ABCD constants, voltage regulation and efficiency of transmission lines.

Travelling waves on transmission lines: Travelling waves – open end line, short circuited line, Line terminated through a resistor, line connected to a cable, Line connected to a T-junction.

UNIT–III: MECHANICAL ASPECTS OF OVER HEAD LINE AND CORONA

(08 Periods)

Insulators— Line supports, overhead line insulators, types of insulators, string efficiency and methods for improvement.

Sag in overhead line: Sag and tension calculations with equal and unequal heights of towers, effect of wind and ice on sag, stringing chart.

Corona: Corona phenomenon - factors affecting corona, critical voltages and power loss, advantages and disadvantages.

UNIT-IV: DISTRIBUTION SYSTEMS   **(07 Periods)**

Classification and Characteristics—residential, commercial, agricultural and industrial loads.

Voltage drop calculations in DC distributors– radial DC distributor fed at one end, at both the ends (equal/unequal voltages)and ring main distributor.

Voltage drop calculations in AC distributors– power factors referred to receiving end voltage and respective load voltages.

UNIT-V: SUBSTATIONS   **(08 Periods)**

Classification of substations — Indoor and outdoor, gas and air insulated substations; Substation layout, different bus bar schemes, location of substations and benefits through optimal location — rating of distribution substations, service area with 'n' primary feeders; Considerations of distribution feeder voltage levels: Radial and loop types of primary feeders and secondary feeders – Feeder loading – Basic design practice of the secondary distribution system.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. Wadhwa, C. L. *Electrical power systems*. 7th edition, New Age International Private limited, 2017.

2. Turan Gonen, *Electric Power Distribution System Engineering,* 3rd edition CRC Press, Taylors and Francis Group, 2014.

REFERENCE BOOKS:

1. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt Ltd, New Delhi, 2002.

2. U.A.Bakshi and M.V.Bakshi, *Transmission and Distribution of Electrical Power*, Fourth revised edition, Technical Publications, 2009.

3. J.B.Gupta, *A Course in Electrical Power*, 11th edition, S.K.Kataria & sons, New Delhi 2013.

4. V.K.Mehta, Rohit Mehta, *Principles of Power System,* revised edition, S.Chand & Company Ltd, 2013.

ADDITIONAL LEARNING RESOURCES:

1. Travelling Wave:https://www.eeeguide.com/travelling-waves-on-transmission-lines/
2. Travelling Waves Lecture: https://nptel.ac.in/courses/108/102/108102119/
3. Power System: https://nptel.ac.in/courses/108/105/108105104/
4. https://edisontechcenter.org/Transmission.html
5. http://www.minnelectrans.com/transmission-system.html
6. Distribution System: https://nptel.ac.in/courses/108/102/108102047/

II B. Tech. – II Semester

(19BT4BS01) MATERIAL SCIENCE

(Open Elective-1)

(Common EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	0	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.

COURSE OUTCOMES:

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

CO1. Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.

CO2. Demonstrate essential information about structure and properties of various composites used in various engineering applications.

CO3. Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

CO4. Accomplish the basic knowledge in nanomaterials to familiarize various nano structured device applications.

CO5. Outline the processing and properties of functionally graded materials and identify its applications in various fields.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO MATERIAL SCIENCE AND ENGINEERING

(08 Periods)

Introduction - historical perspective - material science and engineering, classification of materials (metals, ceramics, polymers and composites) and advanced materials and their applications (biomaterials, smart materials and nanomaterials), modern materials needs. Processing, properties and applications of metals, polymers and ceramics (Qualitative).

UNIT-II: COMPOSITE MATERIALS **(10 Periods)**

Composite Materials - Classification, Laminated composites and Reinforced composite materials – Classification, structure and properties of sandwich composites – applications

(commercial Aircraft, Marine Grade Sandwich, Automobile Grade Sandwich and Wind Turbine Blades), properties and applications of Nano composites - Advantages and Limitations of composites.

UNIT-III: SMART MATERIALS   (07 Periods)

Classification of smart materials -Magneto-rheostatic (MR) and Electro-rheostatic (ER) materials - Shape Memory Alloys (SMA)- characteristics, Shape memory effect applications in different fields, advances in smart materials.

UNIT–IV: NANO AND BIOMIMETIC MATERIALS   (10Periods)

Nanomaterials: Introduction, Low dimensional structures and energy quantization. Fabrication of nano materials - Lithographic technique using photons, metallic, semiconducting and magnetic properties of nano materials and applications (renewable energy and nano electro-mechanical systems (NEMS)).

Biomimetic materials – Introduction- classification and their applications (Lotus effect, Dolphin sound wave technology and viper as a model in defence)

UNIT-V: EMERGING MATERIALS   (10 Periods)

Functionally graded materials (FGM) - Types, processing, properties and potential applications, functionally graded fibre cement – structural material, Functionally Graded Nanoelectronic, Optoelectronic and Thermoelectric Materials (Qualitative) and its applications.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan.

TEXT BOOKS:

1. William D Callister, David G Rethwisch, *Materials Science and Engineering*, Wiley, 9th edition, 2014.
2. K M Gupta, *Engineering Materials – Research, Applications and Advances*, CRC press (Taylor & Francis group), 2015.

REFERENCE BOOKS:

1. Sulabha K Kulkarni*, Nanotechnology: Principles and practices*, Springer, 9th edition, 2014.
2. Charles P. Poole and Frank J. Owens, *Introduction to Nanotechnology*, Wiley-Interscience, May 2003.
3. Sulabha K Kulkarni, *Nanotechnology: Principles and Practices,* Springer, 3rd edition, 2014.

II B. Tech. - II Semester

(19BT4HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Messages & Documents; Careers and Résumés; Interviews.

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

CO1. Demonstrate knowledge of professional communication by examining and applying the styles and strategies of business communication in Communication Networks and Writing Messages.

CO2. Analyze the limitations of business communication by applying and demonstrating corporate communication aspects for effective communication through Interpersonal Communication, Informal Communication, and Crisis Management and Communication.

CO3. Apply appropriate writing techniques for effective professional communication in preparing documents by demonstrating and examining Stages in Writing Business Messages, Strategies for Writing the Body of a Letter, and Structuring Résumés.

CO4. Apply appropriate speaking techniques by examining and demonstrating effective communication in distinguished situations through Corporate Communication and Cross Cultural Communication

DETAILED SYLLABUS:

UNIT- I: NATURE AND SCOPE OF COMMUNICATION   (9 periods)

Introduction: Communication Basics - Functions of Communication – Communication Networks - Interpersonal Communication – Informal Communication - Communication Barriers - Roles of a Manager.

UNIT- II: CORPORATE COMMUNICATION   **(9 periods)**

Introduction: Corporate Communication - Cross-Cultural Communication; Concept & Styles - Corporate Communication Strategy - Corporate Citizenship - Crisis Communication: Case Study.

UNIT- III: **WRITING BUSINESS MESSAGES &DOCUMENTS**   **(9 periods)**

Introduction: Importance of Written Business Communication - Types of Business Messages - Five Main Stages of Writing Business Messages – Business Letter Writing; Kinds of Business Letters – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT- IV: CAREERS AND RÉSUMÉS   **(9 periods)**

Introduction - Career Building - Résumé Formats; Traditional, Electronic and Video Resumés – Sending Résumés - Follow-up Letters - Business Presentations and Speeches; Planning –
Structuring - Organizing – Delivery.

UNIT- V: INTERVIEWS   **(9 periods)**

Introduction - General Preparation for an Interview - Success in an Interview - Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing - Types of Interviewing Questions - Online Recruitment Process.

                                                    Total Periods: 45

Topics for self study are included in lesson plan

TEXT BOOKS:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.
2. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata McGraw-Hill Education, Pvt. Ltd., New Delhi, 2012.

REFERENCE BOOKS:

1. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
2. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

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
6. http://www.resumania.com/arcindex.html

II B. Tech. - II Semester

(19BT4HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

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

CO1. Demonstrate knowledge in concepts, functions, Micro and Macro units, NGOs, Bharatiya Mahila Bank, Women Entrepreneurship, Schemes and Programmes.

CO2. Analyze the idea generation, business plans, business acumen, institutional finance   and rural entrepreneurship.

DETAILED SYLLABUS:

UNIT–I: ENTREPRENEURSHIP DEVELOPMENT   (9 periods)

Introduction to Entrepreneurship Development - Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting Entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

UNIT–II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS

(9 periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents and Significance of Business Plan – Common Errors in Business Plan Formulation – The role of incubation centers for promoting entrepreneurship and start-ups.

UNIT–III: MICRO AND SMALL ENTERPRISES   **(9 periods)**

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – Relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises

UNIT–IV: INSTITUTIONAL FINANCE   **(9 periods)**

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations – Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – SFCs - National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Micro Units Development and Refinance Agency Bank (MUDRA).

UNIT–V: WOMEN & RURAL ENTREPRENEURSHIP   **(9 periods)**

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of Bharatiya Mahila Bank for encouraging Women Entrepreneurs – Micro Finance & Self Help Groups (Basic Concepts).

                                                                    Total periods: 45

Topics for self study are included in lesson plan

TEXT BOOKS:

1. Dr.S.S. Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship*, Excel Books India, 4th edition, 2014.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., New Delhi, 3rd edition, 2013.
2. Bholanath Dutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 3rd edition, 2015.

(19BT4HS06) GERMAN LANGUAGE

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communication; Basic grammar; Basic writing; Berufsdeutcsch (Business German)

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

CO1. Communicate everyday using familiar words with expressions and simple sentences.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION **(9 Periods)**

Introduction - German alphabets, numbers, days in a week, names of months, seasons. Grammar: Nouns –(i)Nominative case and (ii) Nominative personal pronouns, simple sentence, Verb Conjugation 1st and 2nd type, verb Conjugation 3rd type, 'Wh' questions (simple sentences) Nominative (definite and indefinite) Articles

UNIT-II: CITY AND FOOD **(9 Periods)**

In the city: naming places and buildings, means of transport, basic directions. Food: drink, groceries and meals. Apartments: rooms, furniture, colours.
Grammar: Nouns-articles negation–(kein and nicht); imperative and the accusative case; Nominative Possessive Pronouns.

UNIT-III: DAY TO DAY CONVERSATIONS **(9 Periods)**

Everyday life, telling time, making appointments, leisure activities, and celebrations. Different types of professions, Health and the body, Holiday and weather, Clothes and Dresses.

UNIT–IV: BASIC GRAMMAR **(9 Periods)**

Grammar: Possessive articles, Prepositions (am, um, von. bis); Modal verbs, Separable verbs, the accusative, past tense of 'to have' and 'to be', the imperative sentences, dative case, perfect tense.

UNIT-V: BASIC WRITING **(9 Periods)**

Translation from English to German and German to English, Contacts, Writing letters and Email Writing.

Total Periods: 45

Topics for self study are included in lesson plan

TEXT BOOKS:

1. Heuber,Tangram Aktuelleins, HeuberVerlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, Fir fuer Deutsch 1 und Deutsch 2, HeuberVerlag Publications, 2005.
2. Herman Funk, Studio D A1 Cornelsen, GOYAL SAAB Publication, Year 2011.

(19BT4HS08) INDIAN HISTORY

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: -

CORSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES:

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

CO1. Demonstrate contextual knowledge on evolution of ancient and medieval Indian History and acquire awareness on societal and cultural issues.

CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION   (8 Periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT-II: ANCIENT INDIA   (9 Periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT-III: CLASSICAL & MEDIEVAL ERA   (12 Periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT-IV: MODERN INDIA   (6 Periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence; Freedom Struggle (1857-1947).

UNIT-V: INDIA AFTER INDEPENDENCE (1947 -)   **(10 Periods)**

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, ChangingNature of work and organization.

Total Periods: 45

Topics for self-study are included in lesson plan

TEXT BOOK:

1. K. Krishna Reddy, *Indian History,* Tata McGraw-Hill, 21st reprint, 2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.
2. Thapar, Romila, *Early India*, Penguin, 2002.

II B. Tech. - II Semester
(19BT4HS10) PERSONALITY DEVELOPMENT

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: Soft Skills Laboratory

COURSE DESCRIPTION: Personalities and Leadership Qualities; Self Esteem and self Development; Attitude; Communication Relationship; Critical Work Skills and Ethics.

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

CO1. Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.

CO2. Analyze the limitations of Attitudes by applying and demonstrating communication traits through Decision Making, Ethics and Self Actualization.

CO3. Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.

CO4. Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

DETAILED SYLLABUS:

UNIT-I: PERSONALITIES AND LEADERSHIP QUALITIES   (9 periods)

Introduction: Different Personalities **-** Personality Analysis **-** Freudian Analysis **–** Vedantic Concept: Swamy Vivekananda**-** Personality Begets - Types- Leadership Qualities – Decision Making **-** Case Studies: Personalities.

UNIT-II: SELF ESTEEM AND SELF DEVELOPMENT   (9 periods)

Know Yourself: Self Image - Positive Self Esteem -Turn Failure into Success - Be Sensitive to Feedback - Build Self Confidence – Self Actualization - Set Goals - Action Plans - Accountability – Behavior Modification – Mentoring - Learning- Counseling – Challenge yourself with Aptitude Tests and Internships.

UNIT-III: ATTITUDE   **(9 p**_eriods_**)**

Importance – Difference between Behavior and Attitude - Changing Negative Attitude-
Impact of Attitudes on others - Unproductive Attitudes –Assess your Behaviour.

UNIT-IV: COMMUNICATION RELATIONSHIP   **(9 periods)**

Introduction – Positive and Negative Characteristic Traits - Grapevine Communication –
Open Communication; Team Player - Leadership styles – Performance Expectations -
Electronic Communication; Text Messaging – Voicemail – E-Mail

UNIT-V: CRITICAL WORK SKILLS AND ETHICS   **(9 periods)**

Time Management - Balancing Life and Work - Stress Management - Anger Management -
Making Decisions and Solving Problems - Developing Creativity - Ethics and Self-
Righteousness – Being Judgemental in the Real World - Striving for Integrity.

Total Periods: 45

Topics for self study are Included in lesson plan

TEXT BOOKS:

1. Harold R. Wallace and L. Ann Masters, *Personal Development for Life and Work*,
   Cengage Learning, Delhi, 10th edition Indian Reprint, 2011. (6th Indian Reprint 2015)
2. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, 2011.

REFERENCE BOOKS:

1. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, 2nd Revised Edition, 2011.
2. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall,
   Delhi, 16th edition, 2014.

ADDITIONAL LEARNING RESOURCES

1. https://www.universalclass.com/.../the-process-of-perso
2. https://www.ncbi.nlm.nih.gov/pubmed/25545842

II B. Tech. - II Semester

(19BT4HS12) WOMEN EMPOWERMENT

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES:

COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.

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

CO1. Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.

CO2. Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.

CO3. Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.

CO4. Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

DETAILED SYLLABUS:

UNIT-I: CONCEPT & FRAMEWORK   (9 Periods)

Introduction- Empowered Women's Characteristics- Achievements of Women's Empowerment **Concept of Empowerment:** Meaning& Concept- Generalizations about Empowerment -Empowerment Propositions - Choices women can make for empowerment - Women's participation in decision making, development process & in Governance. **Framework for Women's Empowerment** - Five levels of equality- Tenets of Empowerment- Elements - Phases and aspects - Techniques - Categories and Models – Approaches.

UNIT-II: STATUS OF WOMEN   (9 Periods)

Legal Status: Present Scenario- Call for Social change- Significant trends - Legal & Schemes - Personal Law- Joint Family- Criminal Law- Shift towards Dowry - Deterrent Punishment - Criminal Law(II Amendment) - Discrimination in Employment

Political Status: Present Scenario - Political Participation & its Nature- Socio-economic Characteristics - Political Mobilization: Mass Media - Campaign Exposure - Group Orientation - Awareness of issues and participation - Progress & Future Thrust.

UNIT-III: WOMEN'S RIGHT TO WORK   (9 Periods)

Introduction- Present Scenario - Changes in Policy & Programme - National Plan of Action- Women's Cells and Bureau - Increase in work participation rate- Discrimination in labour market - Women in unorganized sector - Issues and Obstacles- Women in Education - Women in Science & Technology - **Case Study:** Linking Education to Women's Access to resources.

UNIT-IV: WOMEN'S PARTICIPATORY DEVELOPMENT   (9 Periods)

Dynamics of social change- conscious participation - Information Explosion - Organized Articulation - National Conference - Common Forums - Participatory Development - New Issues Identified - Role of other Institutions.

UNIT-V: WOMEN ENTREPRENEURSHIP   (9 Periods)

Introduction–Definition-Concept- Traits of women Entrepreneurs- Role of women Entrepreneurs in India -Reasons of Women Entrepreneurship- Government schemes & Financial Institutions to develop Women Entrepreneurs - Key policy recommendations - Project Planning-Suggestions and measures to strengthen women entrepreneurship - Growth & Future challenges - Training and Opportunities - **Case Study:** Training Women as Hand-pump Mechanics- **Case Study** : Literacy for Empowering Craftswomen

Total Periods: 45

Topics for self study are included in lesson plan

TEXT BOOKS:

1. NayakSarojini, Nair Jeevan (2017), "*Women's Empowerment in India*". Pointer Publishers, Jaipur

2. SahaySushama(2013), "*Women and Empowerment*" Discovery Publishing House, New Delhi.

REFERENCE BOOKS:

1. Baluchamy. S (2010), "*Women's Empowerment of Women*". Pointer Publishers, Jaipur.

2. KhobragadeGrishma (2020), "*Women's Empowerment: Challenges and Strategies Empowering Indian Women*", Books clinic Publishing, Chhattisgarh.

ADDITIONAL LEARNING RESOURCES

1. https://www.economicsdiscussion.net/entrepreneurship/women-entrepreneurs-in-india

2. https://www.businessmanagementideas.com/entrepreneurship-2/women-entrepreneurs

II B. Tech.–II Semester

(19BT4HS14) CONSTITUTION OF INDIA

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building

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

CO1. Gain knowledge in Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.

CO2. Apply the reasoning informed by the various aspects in the Constitution, its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

DETAILED SYLLABUS:

UNIT-I: PREAMBLE AND ITS PHILOSOPHY (8 Periods)

Introduction and Evolution of Indian Constitution, preamble and its philosophy

UNIT-II: UNION LEGISLATURE (9 Periods)

The Parliament, Parliamentary Structure, Process of Legislation; President of India – Powers and Functions; Vice President, Prime Minister and Council of Ministers; Constitution Amendment Procedure and Financial Legislation.

UNIT-III: FEDERALISM IN INDIA (10 Periods)

Features of Federal System, Centre-State relations, Directive Principles of State Policy, Administrative Relationship between Union and States; Governors - Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions, Council of Ministers; The Election Commission – Powers and Functions.

UNIT-IV: JUDICIARY AND PUBLIC SERVICES **(9 Periods)**

The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services - State Services - Local Services.

UNIT-V: INTERNATIONAL PARTICIPATION **(9 Periods)**

Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP – India's Role in International Negotiations; Environmentalism in India.

Total Periods: 45

TEXT BOOK:

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005.

REFERENCE BOOK:

1. Mahendra Pal Singh,V. N. Shukla's, Constitution of India, Eastern Book Company, 2011.
2. Pandey J. N., Constitutional Law of India - Central Law Agency, 1998.

II B. Tech. - II Semester

(19BT40205) RELIABILITY AND SAFETY ENGINEERING

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES:

Differential Equations and Multi-Variable Calculus, and Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION:

Fundamentals of reliability engineering;Network modeling and reliability evaluation; Markov chain and Markov processes; basics of safety concepts and safety techniques and applications.

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

CO1. Develop mathematical model of a network to evaluate the parameters for assessing the reliability of a system.

CO2. Analyze the time dependent/independent characteristics of a repairable system and frequency durations techniques to assess reliability.

CO3. understand various safety management, policy, and planning strategies for personal and industrial safety.

CO4. understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF RELIABILITY ENGINEERING   (9 periods)

Random variables, probability concepts, rules for probabilities of events. Probability density and distribution functions.Binomial distribution - Expected value and standard deviation for binomial distribution. Reliability functions, f(t), F(t), h(t) - Relationship between these functions, Exponential density and distribution functions, expected value and standard deviation of exponential distribution. Measures of reliability - MTTF, MTTR, MTBF.Bathtub curve.

UNIT-II: NETWORK MODELING AND RELIABILITY EVALUATION   (9 periods)

Basic concepts - Evaluation of network reliability/unreliability, series systems, parallel systems, series - Parallel configuration systems. Redundant systems and its types.

Evaluation of network Reliability / Unreliability using conditional probability method, tie-set and cut-set based approach, complete event tree and reduced event tree methods.

UNIT-III: MARKOV CHAIN AND MARKOV PROCESSES (9 periods)

Basic concepts, stochastic transitional Probability matrix, time dependent probability evaluation, Limiting State Probability evaluation, Absorbing states. Modeling concepts – State space diagrams, time dependent reliability evaluation of single component repairable model, two component repairable model. Frequency and duration techniques.

UNIT-IV: BASICS OF SAFETY CONCEPTS (9 periods)

Introduction, goals, need for safety, history of safety movement - evolution of modern safety concept, general concepts of safety management. Planning for safety-productivity, quality and safety, line and staff functions, budgeting for safety, safety policy.

UNIT-V: SAFETY TECHNIQUES AND APPLICATIONS (9 periods)

Introduction to safety techniques, Incident Recall Technique (IRT), disaster control, job safety analysis, safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety. Hazard identification techniques, components of safety audit, types of audit, audit methodology, process of safety reporting. Applications of industrial Safety, environmental safety, health safety, electrical safety, fire safety.

Total Periods: 45

Topics for Self-study are provided in the Lesson Plan

TEXT BOOKS:

1. Roy Billinton and Ronald N Allen, *Reliability Evaluation of Engineering Systems*, 2nd edition, Springer, New York, 2013.
2. Frank R. Spellman, Nancy E. Whiting, *Safety Engineering: Principles and Practices*, 3rd edition, Rowman & Littlefield, 2018.

REFERENCE BOOKS:

1. Charles E. Ebeling, *An introduction to reliability and maintainability engineering*, 2nd edition Tata McGraw-Hill Education, 2010.
2. Dan Petersen, *Techniques of Safety Management: A Systems Approach*, 4th edition american society of safety engineers, 2003.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/105/108/105108128/
2. https://nptel.ac.in/courses/110/105/110105094/
3. https://www.youtube.com/watch?v=uutg8jKrL9w
4. https://www.youtube.com/watch?v=_c-iZ2BAXPw
5. https://www.youtube.com/watch?v=GeMCF3s5EDk
6. https://www.youtube.com/watch?v=xYWyype7cxE

II B. Tech. - II Semester

(19BT50107) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PREREQUISITES: -

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES:

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

CO1. Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.

CO2. Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO5. Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT–I: AIR AND NOISE POLLUTION **(08 Periods)**

Air Pollution: Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern; Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity, Impacts of noise, permissible limits of noise pollution, measurement of noise, Noise standards.

UNIT–II: AIR AND NOISE POLLUTION CONTROL **(10 Periods)**

Self cleansing properties of the environment, Dilution method, Control at source, Process changes and equipment modifications, Control of particulates – Types of equipment, Design and operation - Settling chambers, Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseous pollutants – Adsorption, Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution, Case studies, Latest developments in the air and noise pollution control.

UNIT–III: WATER POLLUTION AND CONTROL **(10 Periods)**

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment process and disposal – Primary, Secondary, Tertiary; Case studies, Latest developments in the water pollution control.

UNIT–IV: SOIL POLLUTION AND CONTROL **(08 Periods)**

Soil pollutants, Sources of soil pollution, Causes, Effects and control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Soil quality standards, Case studies, Latest developments in the soil pollution control.

UNIT–V: MUNICIPAL SOLID WASTE MANAGEMENT **(09 Periods)**

Municipal solid waste – Types, Composition and characteristics; Methods of collection and transportation; Methods of disposal – Open dumping, Sanitary landfill, Composting and Incineration; Utilization - 6R Concept, Recovery and recycling and Energy Recovery; Latest developments in solid waste management

Total Periods: 45

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

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C. S. Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M. N. Rao and H. V. N. Rao, *Air Pollution,* Tata McGraw–Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier)*,* 5th Edition, 2014.
3. S. M. Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt. Ltd., 2nd Edition, 2007.
4. V. M. Domkundwar, *Environmental Engineering*, Dhanpat Rai & Co. Pvt. Ltd., New Delhi, 2014.

ADDITIONAL LEARNING RESOURCES:

1. National Ambient Air Quality Standards, Central Pollution Control Board, New Delhi
2. Specifications for Drinking Water Standards, IS10500:2012
3. Solid Waste Management Rules, 2016

II B. Tech. - II Semester
(19BT50108) PLANNING FOR SUSTAINABLE DEVELOPMENT
(Open Elective-1)
(Common EEE, ECE & EIE)

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

PREREQUISITES: -

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

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

CO1. Compare sustainable development theories in national and global context to protect the society and environment.

CO2. Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.

CO3. Analyze policies and governance for sustainable development considering ethics, economics, society and environment.

CO4. Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.

CO5. Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

DETAILED SYLLABUS:

UNIT–I: SUSTAINABLE DEVELOPMENT   (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability-National and global context; Sustainable development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT–II: ENVIRONMENTAL IMPACT   (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT–III: SUSTAINABLE POLICIES AND GOVERNANCE   (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of

sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT–IV: SUSTAINABLE SYSTEMS AND STRATAGIES **(09 Periods)**

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT–V: MEDIA AND EDUCATION FOR SUSTAINABILITY **(09 Periods)**

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

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

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

ADDITIONAL LEARNING RESOURCES:

1. Anil Markandya, Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002.

(19BT50109) RURAL TECHNOLOGY

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES:-

COURSE DESCRIPTION: Technology for rural development; Nonconventional energy; Technologies for rural development; Community development; IT in rural development.

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

CO1. Compare various technologies for rural development by solving rural problems through different schemes by considering ethics, society, environment and sustainability.

CO2. Analyzenon-conventional energy sources using appropriate tools and techniques to solve rural energy problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO3. Select appropriate technologies in different areas of rural development to solve rural issues following latest developments considering society, environment and sustainability.

CO4. Relate water conservation, health, safety and rural employment issues for community development to solve rural problems through appropriate technologies considering ethics, society, environment and sustainability.

CO5. Analyze the impact of IT, public and private partner siphon rural development to solve complex rural problems using appropriate tools and techniques considering ethics, society, environment and sustainability.

DETAILED SYLLABUS:

UNIT–I: TECHNOLOGY FOR RURAL DEVLOPMENT   (09 Periods)

India - Technology and rural development, Pre and post-independence period, Rural India Life, Indian farmer, Role of science and technology in rural development, Rural technology and poverty eradication, Rural business hubs, Technology in improving rural infrastructure, Various organizations related to innovation, Issues of technology transfer - CAPART, NABARD, CSIR, NIF.

UNIT–II: NON-CONVENTIONAL ENERGY   **(09 Periods)**

Definition of energy, Types of alternative sources of energy, Sources of nonconventional energy – Solar energy: Solar pump in agriculture, Solar dryer, Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT–III: TECHNOLOGIES FOR RURAL DEVELOPMENT   **(09 Periods)**

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries, Latest developments in rural technologies.

UNIT–IV: COMMUNITY DEVELOPMENT   **(09 Periods)**

Water conservation, Rain water Harvesting, Drinking water Standards and simple treatments used, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture, Aquaculture.

UNIT–V: IT IN RURAL DEVELOPMENT   **(09 Periods)**

Role of information technology (IT) in rural areas, Impact of IT in rural development, Need and necessity of technology, Corporate social responsibilities, Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and service sectors) and Saansad Adarsh Gram Yojana (SAGY), Village adoption schemes.

                                         Total Periods: *45*

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

TEXT BOOKS:

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2nd Edition 2018.

2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 1st Edition, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development*, Pacific Book International, 1st Edition, 2012.

2. Shivakanth Singh, *Rural Development Policies and Programmes*, Northern Book Centre, 1st Edition, 2002.

3. Katar Singh and Anil Shishodia*, Rural Development: Principles, Policies, and Management,* SAGE Publications India Private Limited, 4th Edition, 2016.

4. A. Vinayak Reddy, M. Yadagira Charyulu, *Rural Development in India: Policies & Initiatives,* New Century Publications, 1st Edition, 2008.

ADDITIONAL LEARNING RESOURCES:

1. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 9th Edition, 2019.
2. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*, Himalaya Publishing House, 1st Edition, 2017.

(19BT50505) ETHICAL HACKING

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PREREQUISITES: -

COURSE DESCRIPTION:

Ethical hacking, Network and computer attacks, Footprinting, Social engineering, Port scanning, System hacking, Sniffers, Denial of service, Hacking web servers, Wireless hacking, Cryptography, Network Protection System.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on the computer security, social engineering and the intent of ethical hacking.

CO2. Select and apply footprinting and port scanning tools to discover vulnerabilities of the computer system.

CO3. Investigate hacking techniques and tools to maintain computer security.

CO4. Analyze cryptosystems and network protection systems for information security and intrusion prevention.

DETAILED SYLLABUS:

UNIT-I: ETHICAL HACKING, NETWORK AND COMPUTER ATTACKS   (9 periods)

Introduction to Ethical Hacking: The role of security and penetration testers, Penetration-Testing methodologies, What you can and cannot do legally.

Network and Computer Attacks: Malicious software, Trojans, Backdoors, Viruses, and Worms, Protection against malware attacks, Intruder attacks on networks and computers, Addressing physical security.

UNIT-II: TCP/IP CONCEPTS AND SOCIAL ENGINEERING   (9 periods)

TCP/IP Concepts: Overview of TCP/IP – Application layer, Transport layer, Internet layer; IP addressing – Planning IP address assignments, IPv6 addressing.

Social Engineering: What is social engineering, What are the common types of attacks, Understand insider attacks, Understand identity theft, Describe phishing attacks,

Understand online scams, Understand URL obfuscation, Social engineering countermeasures.

UNIT-III: FOOTPRINTING ANDPORT SCANNING   **(9 Periods)**

Footprinting: Using web tools for foot printing, Conducting competitive intelligence, Using domain name system zone transfers.

Port Scanning: Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNIT-IV: SYSTEM HACKING   **(9 Periods)**

System hacking -Password cracking techniques, Types of passwords, Key loggers and other spyware technologies, Escalating privileges, Root kits, How to hide files, Steganography technologies, How to cover your tracks and evidences; Sniffers - Protocols susceptible to sniffing, Active and passive sniffing, ARP poisoning, Ethereal capture and display filters, MAC flooding, DNS spoofing techniques, Sniffing countermeasures; Denial of Service - Types of DoS attacks, How DDoS attacks work, How BOTs/BOTNETs work, Smurf attack, SYN flooding, DoS/DDoS counter measures; Session hijacking - Spoofing vs. hijacking, Types of session hijacking, Sequence prediction, Steps in performing session hijacking, Preventing session hijacking.

UNIT-V: CRYPTOGRAPHY, NETWORK PROTECTION SYSTEMS   **(9 periods)**

Cryptography: Understanding Cryptography basics, Symmetric and asymmetric algorithms, Public key infrastructure, Cryptography attacks.

Network Protection Systems: Understanding routers, Firewalls, Honey pots.

                                                        Total Periods: 45

Topics for self-study are included in lesson plan

TEXT BOOKS:

1. Michael T. Simpson, Kent Backman, James E. Corley, *Hands-On Ethical Hacking and Network Defense*, 3rd Edition, Cengage Learning, 2017.
2. Kimberly Graves, *CEH: Official Certified Ethical Hacker Review Guide*, Wiley, 2007.

REFERENCE BOOK(S):

1. Michael Gregg, *Certified Ethical Hacker (CEH) Cert guide*,3rd Edition, Pearson, 2019.

II B. Tech. - II Semester

(19BT51207) AI IN HEALTHCARE

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PREREQUISITES: -

COURSE DESCRIPTION: Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties; The Role of Major Corporations in AI in Healthcare; Applications of AI in Healthcare.

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

CO1. Understand the fundamental concepts of AI in Healthcare sector.

CO2. Understand the applications of AI in Healthcare specialties.

CO3. Demonstrate AI applications developed by corporate companies.

CO4. Demonstrate knowledge on future applications of Healthcare using AI.

CO5. Understand the principles of AI applications through case studies.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN HEALTHCARE

(08 periods)

Introduction to AI in Healthcare, Benefits and Risks, AI in the health sector, AI versus Human Intelligence, The future of AI in health sector, AI and Neural networks.

UNIT-II: THE PRESENT STATE AND FUTURE OF AI IN HEALTHCARE SPECIALTIES
(10 periods)

Artificial Intelligence in: preventive healthcare, Radiology, Pathology, Surgery, Anesthesiology, Psychiatry, Cardiology, Pharmacy, Dermatology, Dentistry, Orthopedics, Ophthalmology.

UNIT-III: THE ROLE OF MAJOR CORPORATIONS IN AI IN HEALTHCARE

(08 periods)

IBM Watson, The role of Google and Deep mind in AI in Healthcare, Baidu, Facebook and AI in Healthcare, Microsoft and AI in Healthcare.

UNIT-IV: FUTURE OF HEALTHCARE IN AI   **(10 periods)**

Evidence-based medicine, personalized medicine, Connected medicine, Disease and Condition Management , Virtual Assistants, Remote Monitoring, Medication Adherence, Accessible Diagnostic Tests, Smart Implantables, Digital Health and Therapeutics, Education, Incentivized Wellness. Artificial Intelligence, Block chain, Robots, Robot-Assisted Surgery, Exoskeletons, Inpatient Care, Companions, Drones, Smart Places, Smart Homes, Smart Hospitals, Reductionism, Innovation vs. Deliberation.

UNIT-V: APPLICATIONS OF AI IN HEALTHCARE   **(09 periods)**

Case Study 1: AI for Imaging of Diabetic Foot Concerns and Prioritization of Referral for Improvements in Morbidity and Mortality.

Case Study 2: Outcomes of a Digitally Delivered, Low-Carbohydrate, Type 2 Diabetes Self-Management.

Case Study 3: Delivering a Scalable and Engaging Digital Therapy.

Case Study 4: Improving Learning Outcomes for Junior Doctors through the Novel Use of Augmented and Virtual Reality for Epilepsy

Case Study 5: Big Data, Big Impact, Big Ethics-Diagnosing Disease Risk from Patient Data.

Total Periods: 45

Topics for self-study shall be included in lesson plan.

TEXT BOOKS:

1. Dr. ParagMahajan, *Artificial Intelligence in Healthcare, MedManthra Publications*, First Edition 2019.

2. *ArjunPanesar, Machine Learning and AI for Healthcare Big Data for Improved Health*, Apress Publications, 2019*.*

REFERENCE BOOKS:

1. Michael Matheny, Sonoo Thadaney Israni, Mahnoor Ahmed, and Danielle Whicher, *Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril*, National Academy of Medicine Publication, First Edition, 2019.

ADDITIONAL LEARNING RESOURCES:

1. https://www.udacity.com/course/ai-for-healthcare-nanodegree--nd320   (AI   for Healthcare).

2. https://builtin.com/artificial-intelligence/artificial-intelligence-healthcare(Surgical robots, new medicines and better care: 32 examples of AI in healthcare).

3. https://healthtechmagazine.net/article/2020/02/future-artificial-intelligence-healthcare (Future of Artificial Intelligence in Healthcare).

II B. Tech. - II Semester
(19BT51506) BIOINFORMATICS

(Open Elective-1)

(Common EEE, ECE & EIE)

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

PRE-REQUISITES: A course on "Biology for Engineers".

COURSE DESCRIPTION:

Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics

COURSE OUTCOMES:

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

CO1. Understand basic biological data acquisition in bioinformatics.

CO2. Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.

CO3. Analyze the results of bioinformatics data using text and sequence-based searching techniques.

CO4. Analyze the secondary and tertiary structures of proteins by applying different alignment programs

CO5. Design biological databases and novel drugs by using contextual knowledge on bioinformatics.

DETAILED SYLLABUS:

UNIT-I: BIOLOGICAL DATA ACQUISITION   (9 Periods)

Biological information, Retrieval methods for DNA sequence, protein sequence and protein structure information

UNIT-II: DATABASES   (9 Periods)

Format and Annotation: Conventions for database indexing and specification of search terms, Common sequence file formats. Annotated sequence databases - primary and secondary sequence databases, protein sequence and structure databases.

UNIT-III: DATA PROCESSING   **(9 Periods)**

Data – Access, Retrieval and Submission: Standard search engines; Data retrieval tools – Entrez, DBGET and SRS; Submission of (new and revised) data; Sequence Similarity Searches: Local and global. Distance metrics. Similarity and homology. Scoring matrices, PAM and BLOSUM

UNIT-IV: METHODS OF ANALYSIS   **(9 Periods)**

Dynamic programming algorithms, Needleman-Wunsch and Smith-waterman. Heuristic Methods of sequence alignment, FASTA and BLAST; Multiple Sequence Alignment and software tools for pair wise and multiple sequence alignment, CLUSTAL program, Prediction of Tertiary structure of proteins.

UNIT-V: APPLICATIONS   **(9 Periods)**

Genome Annotation and Gene Prediction; ORF finding; Phylogenetic Analysis, Genomics, Proteomics, Genome analysis – Genome annotation, DNA Microarray, computer aided drug design (CADD).

                                                    Total Periods: 45

Topics for Self-Study are provided in Lesson Plan

TEXT BOOKS:

1. Lesk, A. K., "Introduction to Bioinformatics" 4th Edition, Oxford University Press, 2013
2. Dan Gusfield, "Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology" Cambridge University Press, 1997.

REFERENCE BOOKS:

1. Baldi, P. and Brunak, S., "Bioinformatics: The Machine Learning Approach" 2nd Edition, MIT Press. 2001
2. Mount, D.W., "Bioinformatics Sequence and Genome Analysis" 2nd Edition, Cold Spring Harbor Laboratory Press, 2004
3. Tindall, J., "Beginning Perl for Bioinformatics: An introduction to Perl for Biologists" 1st Edition, O'Reilly Media, 2001

(19BT40231) DIGITAL ELECTRONICS LAB

(EEE)

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

PRE-REQUISITES:

Electronic devices and circuits.

COURSE DESCRIPTION:

Practical investigations through simulation on logic gates; minimization of circuits; design of various combinational and sequential logic circuits.

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

CO1. perform various arithmetic operations on number systems and analyze simplification methods in logical circuits, to perform desired logical operations optimally using logical gates.

CO2. design combinational logical circuits for performing various arithmetic operations and data encoding and decoding for engineering applications.

CO3. analyze various sequential circuits for realizing counters and registers using flip-flops.

CO4. work independently / in groups, and communicate effectively in oral and written forms.

Practical Exercises/List of Experiments:

Part-A: Analytical Exercises:

1. Number systems and their conversions.
2. Arithmetic operations on weighted non-weighted numbers.

Part-B: Any EIGHT experiments are to be conducted from the following

1. Verification of logic gates.
2. Minimization of logic circuits using K-Map.
3. Design of half adder & subtractor and full adder & subtractor.
4. Design of 4 bit comparator.
5. Design of 3 to 8 decoder & 8 to 3 encoder for an engineering application.
6. Design of 8 to 1 multiplexer.
7. Design of 4 bit
    a. binary adder and
    b. binary adder-subtractor

8. Design of 4 bit binary in crementer using 4 half adders.

9. Design of 4-bit combinational circuit shifter.

10. Design of BCD to seven segment decoder.

11. Design of 1 stage of logic circuit using logical gates and 4x1 multiplexer.

12. Design SR, JK, T and D Flip flops using logic gates.

13. Design a ring counter using flip flops.

TEXT BOOKS:

1. M. Morris Mano, *Digital Design*, Pearson education, 5th edition, 2013.

REFERENCE BOOKS

1. Anand Kumar, *Switching Theory and Logic Design*, PHI, 2008

2. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory*, Tata McGraw-Hill, 2nd edition, 1978

ADDITIONAL LEARNING RESOURCES:

1. http://cse15-iiith.vlabs.ac.in/

2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dldgates/labs/index.php

II B.Tech. – II Semester

(19BT40232) ELECTRICAL ENGINEERING WORKSHOP

(EEE)

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

PRE-REQUISITES:

Electric Circuits Lab and Electrical Machines-1 Lab.

COURSE DESCRIPTION: Exercises on assessing of electrical parameters and functionality of electrical apparatus; Design and estimation of electrical systems, and protection system for electrical devices and systems; Troubleshooting of electrical appliances and Calibration of measuring instruments.

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

CO1. evaluate various electrical quantities using modern utilities, assess the functionality of various devices and analyze the practical observations for calibration.

CO2. design operating equipment for the various electrical appliances for sustainable operation, and estimate typical house wiring system following the code of conduct and realize the technological developments in design of operating equipment.

CO3. analyze various electrical appliances for troubleshooting and maintenance, and protection schemes for safety of personals and apparatus, and realize the technological developments in protection.

CO4. work independently / in groups, and communicate effectively in oral and written forms.

List of Exercises/List of Experiments:

Minimum **Ten** experiments are to be conducted.

1. Measurement of electrical quantities using MFM.
2. Operation and testing of Fuse, MCB and Relays.
3. Calibration of measuring instruments.
4. Practice bridges for measurement of circuit element parameters.
5. Design of starter for DC Motors.
6. Practicing and testing of DOL starter for Induction Motors.
7. Design of Timers for operation of electrical appliances.
8. Design and estimation of wiring for a typical house.

9. Troubleshooting of electrical appliances —Fan, Mixer/grinder, Water heater/Iron box.

10. Practicing plate and pipe earthing system.

11. Protection scheme for a 3-Phase Induction Motor. (Single Phasing, OL, Dry Run)

12. Installation and maintenance of UPS.

REFERENCE BOOKS/LABORATORY MANUALS:

1. http://www.srisaiuniversity.org/downloads/files/n59b79d6117211.pdf
2. https://www.gtu.ac.in/syllabus/NEW_Diploma/sem-1/Pdf%20Content%20detailing/3312401Electrical%20&%20Electronic%20Workshop.pdf

ADDITIONAL LEARNING RESOURCES:

1. https://www.youtube.com/watch?v=ax-KUL17YJ4
2. https://www.youtube.com/watch?v=TJpQ3fZIt20
3. https://www.youtube.com/watch?v=6RJnsa83xTA
4. https://www.youtube.com/watch?v=w2M4tS2OMsU
5. https://www.youtube.com/watch?v=DzVJiSQNbew

II B. Tech. – II Semester

(19BT40233) ELECTRICAL MACHINES-2 LAB

(EEE)

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

PRE-REQUISITES:

Electrical Machines-1 and Electrical Machines-1Lab

COURSE DESCRIPTION:

Practical investigations on asynchronous and synchronous machines; Performance indices analysis, determination of equivalent circuit parameters and speed control methods of induction motor.

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

CO1. analyze the performance of induction machines to evaluate operating parameters and interpret the practical observations for validation.

CO2. analyze the performance of synchronous machines to evaluate operating parameters and interpret the practical observations for validation.

CO3. analyze the performance of universal motor for various loading conditions.

CO4. realize the philosophy of testing procedure of synchronous and asynchronous machines following the code of conduct.

CO5. work independently / in groups, and communicate effectively in oral and written forms.

List of Exercises/List of Experiments:

Minimum Ten experiments are to be conducted.

1. Brake test on three phase induction motor.
2. Separation of no-load losses of three phase induction motor
3. Speed control of induction motor
4. No load and blocked rotor test on three phase induction motor.
5. Regulation of a three phase alternator by E.M.F and M.M.F. methods.
6. Regulation of three phase alternator by Z.P.F. and A.S.A methods.
7. Efficiency of a three phase alternator.
8. Slip test on a salient pole synchronous machine.
9. V and inverted V curves of a three phase synchronous motor.
10. Equivalent circuit of single phase induction motor.
11. Brake test on universal motor.

12. Parallel operation of alternators.

TEXT BOOKS:

1. P.S. Bimbhra, *Electrical Machinery*, 7th edition, Khanna Publishers, New Delhi, 2011.
2. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase circuits & AC machines) in SI Units*, 15thedition,S.K. Kataria& Sons, New Delhi, 2015.

REFERENCE BOOKS:

1. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, 6th edition, McGraw-Hill, New Delhi, 2008.
2. B.L. Theraja and A.K. Theraja, *A Text Book of Electrical Technology in S. I. Units*, Vol.2, S.Chand Company Ltd, Multicolour edition, New Delhi, 2014.

SOFTWARE/Tools used: Nil

ADDITIONAL LEARNING RESOURCES:

1. http://www.vlab.co.in/broad-area-electrical-engineering

II B. Tech. – II Semester

(19BT315AC) DESIGN THINKING

(Audit Course)

(Common to EEE, ECE & EIE)

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

TEXTBOOK:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "*Introduction to Design Thinking*",Tata McGraw 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", John Wiley & Sons, 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/