ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

COMPUTER SCIENCE AND SYSTEMS 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

Through multidimensional excellence, we value intellectual curiosity, pursuit of knowledge building and dissemination, academic freedom and integrity to enable the students to realize their potential. We promote technical mastery of Progressive Technologies, understanding their ramifications in the future society and nurture the next generation of skilled professionals to compete in an increasingly complex world, which requires practical and critical understanding of all aspects.

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 COMPUTER SCIENCE AND SYSTEMS ENGINEERING

<u>VISION</u>

To become a centre of excellence in Computer Sciences and Systems Engineering through teaching, training, research and innovation to create quality engineering professionals who can solve the growing complex problems of the society.

<u>MISSION</u>

➢ Established with the cause of development of technical education in advanced computer sciences and engineering with applications to systems there by serving the society and nation.

➢ Transfer of Knowledge through contemporary curriculum and fostering faculty and student development.

➢ Create keen interest for research and innovation among students and faculty by understanding the needs of the society and industry.

➢ Skill development among diversity of students in technical domains and profession for development of systems and processes to meet the demands of the industry and research.

➢ Imbibing values and ethics in students for prospective and promising engineering profession and develop a sense of respect for all.

PROGRAM EDUCATIONAL OBJECTIVES

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

1. Demonstrate competencies in the Computer Science domain and Management with an ability to comprehend, analyze, design and create software systems for pursuing advanced studies in the areas of interest.

2. Evolve as entrepreneurs or be employed by acquiring required skill sets for developing computer systems and solutions in multi-disciplinary areas.

3. Exhibit progression and professional skill development in Computer programming and systems development with ethical attitude through life-long learning.

PROGRAM OUTCOMES

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

PSO1 Employ Systems Approach to model the solutions for real life problems, design and develop software systems by applying Modern Tools.

PSO2 Develop solutions using novel algorithms in High Performance Computing and Data Science.

PSO3 Use emerging technologies for providing security and privacy to design, deploy and manage network systems.

SREE VIDYANIKETHAN ENGINEERING COLLEGE (AUTONOMOUS)

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

ACADEMIC REGULATIONS (SVEC-19)

CHOICE BASED CREDIT SYSTEM

B.Tech. Regular Four Year Degree Program

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

and

B.Tech. (Lateral Entry Scheme)

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

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

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

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

3. Admission:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1) Civil Engineering

2) Computer Science and Business Systems

3) Computer Science and Engineering

4) Computer Science and Engineering (Artificial Intelligence)

5) Computer Science and Engineering (Data Science)

6) Computer Science and Systems Engineering

7) Electrical and Electronics Engineering

8) Electronics and Communication Engineering

9) Electronics and Instrumentation Engineering

10) Information Technology

11) Mechanical Engineering

5.   Duration of the Program:

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

5.2   Maximum Duration:

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

6.   Structure of the Program:

Each Program of study shall consist of:

(i)   HS (Humanities and Social Sciences) Courses

(ii)   BS (Basic Sciences) Courses

(iii)   ES (Engineering Sciences) Courses

(iv)   PC (Professional Core) Courses

(v)   PE (Professional Electives)

(vi)   OE (Open Electives) Courses

(vii)   Mandatory Courses (MC)

(viii)   Audit Courses (AC)

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

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

Contact Periods:

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

7.   Credit Courses:

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

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

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

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

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

8. **Choice Based Credit System (CBCS):**

Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:
- Student centred learning
- Students to learn courses of their choice
- Interdisciplinary learning

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

9. **Course Enrollment and Registration**

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

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

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

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

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

10. OPEN ELECTIVE (MOOC)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12. Examination System:

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

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
1.	Theory	60	Semester-end examination for 3 hours duration (External evaluation)		The examination question paper in theory courses shall be for a maximum of 60 marks. The question paper shall be of descriptive type with 10 questions each of 12 marks, taken two from each unit. Each unit shall have internal choice and 5 questions shall be answered, one from each unit.
		40	10	Assignments (Internal evaluation).	One Assignment shall be given to the student for 10 marks during the semester and Assignment Marks finalized.

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
		30	Mid-term Examination of 2 hours duration (Internal evaluation).		Two mid-term examinations each for 30 marks are to be conducted. For a total of 30 marks, 80% of better one of the two and 20% of the other one are added and finalized. **Mid-I:** After first spell of instruction (I & II Units). **Mid-II**: After second spell of instruction (III, IV & V Units). The question paper shall be of descriptive type with 5 essay type questions each of 8 marks, out of which 3 are to be answered and evaluated for 24 marks. There shall also be 6 short answer questions each of 01 mark, all are to be answered and evaluated for 6 marks.
2	Laboratory	50	Semester-end Lab Examination for 3 hours duration (External evaluation)		The examination shall be conducted by the faculty member handling the laboratory (Examiner-2) and another faculty member (Examiner-1) appointed by the Chief Controller of Examinations.
		50	30	Day-to-Day evaluation for Performance in laboratory experiments and Record. (Internal evaluation).	Two laboratory examinations, which includes Day-to-Day evaluation and Practical test, each for 50 marks are to be evaluated by the faculty members handling the laboratory. For a total of 50 marks 80% of better one of the two and 20% of the other one are added and finalized. **Laboratory examination-I:** Shall be conducted just before FIRST mid-term examinations. **Laboratory examination-II:** Shall be conducted just before SECOND mid-term examinations.
			20	Practical test (Internal evaluation).	
3	Internship	100	Semester-end Examination		The evaluation shall be done by the Department Evaluation Committee (**DEC**) at the end of the semester as given in 12.2.1.
4	Open Elective (MOOC)	100	Semester-end Examination for **3 hours duration**		The evaluation shall be done by the department through ONLINE with 50 multiple choice questions.
5	Socially Relevant Project	100	50	Internal Evaluation	Shall be evaluated as given in 12.2.2(i)
			50	Semester-end evaluation	Viva-Voce examination shall be conducted at the end of the semester as given in 12.2.2(ii)
6	Mandatory courses	40	Internal Evaluation		Shall be evaluated as given in 12.2.4

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

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

12.2.1 Internship:

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

12.2.2 Socially Relevant Project:

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

(i) Internal Evaluation: Two internal evaluations (First evaluation before the I-Mid-term examinations and second evaluation before the II-Mid-term examinations) shall be conducted by the guide and a faculty member nominated by the HOD. For a total of 50 marks, 80% of better one of the two and 20% of the other one are added and finalized.

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

12.2.3 Project Work:

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

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

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

12.2.4 Mandatory Courses:

Mandatory courses carry **"ZERO"** credits. There shall be **NO Semester-end** examination. However, ATTENDANCE in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The internal examination shall be conducted and evaluated similar to the THEORY courses. The student shall be declared to have passed the mandatory courses only when HE secures **40% marks in the internal examination.** If the student FAILS, a re-examination shall be conducted for FAILED candidates in the CONSEQUETIVE semester. The performance of the student shall be indicated in the grade sheets **"SATISFACTORY" (or) "NOT SATISFACTORY"** as given in 17.1**.** The student should pass all the mandatory courses, for the award of B.Tech degree.

12.2.5 Audit Courses:

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

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

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

12.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

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

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

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

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

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

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

12.4. Evaluation:

Following procedure governs the evaluation.

12.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the Semester-

end examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Semester-end examinations, to arrive at the total marks for any course in that semester.

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

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

12.5. **Recounting /Revaluation/Personal Verification/ Challenging Evaluation:** Students shall be permitted to apply for **Recounting /Revaluation/Personal Verification/ Challenging Evaluation** of the Semester-end examination answer scripts within a stipulated period after payment of the prescribed fee. After completion of the process of **Recounting /Revaluation/Personal Verification/ Challenging Evaluation**, the records are updated with changes if any, and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

12.6. **Supplementary Examination:**

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

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

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

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

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

13.2 A student shall be promoted from second year to third year of Program of study only if he fulfills the academic requirement of securing 25 credits from the following examinations (Irrespective of whether or not the candidate appears for the semester-end examinations as per the normal course of study):

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

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

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

13.3 A student shall be promoted from third year to fourth year of Program of study only if he fulfills the academic requirements of securing 42 credits from the following examinations (Irrespective of whether or not the candidate appears for the semester-end examinations as per the normal course of study):

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

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

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

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

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

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

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

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

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

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

13.7 A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 25 credits from the following examinations:

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

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

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

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

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

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

14. **Minor degree in a discipline:**

The concept of Minor degree is introduced in the curriculum of all B. Tech. programs offering a Major degree. The main objective of Minor degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B.Tech Program. In order to earn a Minor degree in a discipline, a student has to earn 20 extra credits (By studying SIX theory and TWO laboratory courses) from the core courses of the minor discipline.

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

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

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

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

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

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

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

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

i. The **Minor degree** shall be mentioned in the degree certificate as Bachelor of Technology in **XXX** with Minor in **YYY**. For example, Bachelor of Technology in **Computer Science & Engineering** with Minor in **Electronics & Communication Engineering**. This shall also be reflected in the transcripts, along with the list of courses taken for **Minor degree** program with CGPA mentioned separately.

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

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

15. Honours degree in a discipline:

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

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

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

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

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

16.   Transitory Regulations:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the Program in earlier regulations (or) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent courses as and when courses are offered and they shall be in the academic regulations into which they are presently readmitted.

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

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

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

Grades Conversion and Grade points Attached

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

Pass Marks:

A student shall be declared to have passed theory course, laboratory course, Socially relevant project and project work if he secures minimum of 40% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. For Industrial training/internship he shall be declared to have passed if he secures minimum of 40% of marks in the semester-end examination. Otherwise, he shall be awarded fail grade - '**F**' in such a course irrespective of internal marks. '**F**' is considered as a fail grade indicating that the student has to pass the Semester-End Examination in that course in future and obtain a grade other than '**F**' and '**N**' for passing the course.

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

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

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

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

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

17.3. Cumulative Grade Point Average (CGPA):

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

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

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

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

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

20. Award of Degree: 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.

ANNEXURE-I
GUIDELINES FOR DISCIPLINARY ACTION FOR MALPRACTICES/ IMPROPER CONDUCT IN EXAMINATIONS

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

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

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

SVEC-19 CURRICULUM

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

COMPUTER SCIENCE AND SYSTEMS ENGINEERING

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

COURSE STRUCTURE

COMPUTER SCIENCE AND SYSTEMS ENGINEERING

I B.Tech. – I Semester

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

I B.Tech. – II Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT2BS01	Transformation Techniques and Linear Algebra	3	1	-	4	4	40	60	100
2	19BT1BS02	Biology for Engineers	2	-	-	2	2	40	60	100
3	19BT1BS03	Engineering Physics	3	-	-	3	3	40	60	100
4	19BT10201	Basic Electrical and Electronics Engineering	3	-	-	3	3	40	60	100
5	19BT20501	Digital Logic Design	3	-	-	3	3	40	60	100
6	19BT21501	Object Oriented Programming through Java	3	-	-	3	3	40	60	100
7	19BT1BS31	Engineering Physics Lab	-	-	2	2	1	50	50	100
8	19BT10231	Basic Electrical and Electronics Engineering Lab	-	-	2	2	1	50	50	100
9	19BT20331	Engineering Workshop	-	-	2	2	1	50	50	100
10	19BT21531	Object Oriented Programming through Java Lab	-	1	2	3	2	50	50	100
		Total:	17	2	8	27	23	440	560	1000
11	19BT1AC01	Spoken English	2	-	-	2	-	-	-	-

II B.Tech. – I Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT3BS01	Numerical Methods, Probability and Statistics	3	1	-	4	4	40	60	100
2	19BT30502	Computer Organization	3	-	-	3	3	40	60	100
3	19BT31201	Discrete Mathematical Structures	3	-	-	3	3	40	60	100
4	19BT31501	Data Structures and Algorithms	3	1	-	4	4	40	60	100
5	19BT31502	Operating Systems	3	-	-	3	3	40	60	100
6	19BT31503	System Programming	3	-	-	3	3	40	60	100
7	19BT31531	Data Structures and Algorithms Lab	-	-	2	2	1	50	50	100
8	19BT31532	Operating Systems Lab	-	-	2	2	1	50	50	100
9	19BT31533	Workshop in Computer Science and Systems Engineering	-	-	2	2	1	50	50	100
		Total:	18	2	6	26	23	390	510	900
10	19BT315AC	Design Thinking	2	-	-	2	-	-	-	-

II B.Tech. – II Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT40502	Database Management Systems	3	1	-	4	4	40	60	100
2	19BT40503	Design and Analysis of algorithms	3	-	-	3	3	40	60	100
3	19BT31202	Software Engineering	3	-	-	3	3	40	60	100
4	19BT41501	Theory of Computation	3	-	-	3	3	40	60	100
5	**Open Elective-2**		3	-	-	3	3	40	60	100
6	19BT3HS31	Soft Skills Lab	-	-	2	2	1	50	50	100
7	19BT40532	Database Management Systems Lab	-	-	2	2	1	50	50	100
8	19BT31232	Software Engineering Lab	-	-	2	2	1	50	50	100
9	19BT41531	Design and Analysis of Algorithms Lab	-	-	2	2	1	50	50	100
		Total:	**15**	**1**	**8**	**24**	**20**	**400**	**500**	**900**
10	19BT3MC01	Environmental Science	2	-	-	2	-	40	--	40

III B. Tech. – I Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT50503	Artificial Intelligence	3	-	-	3	3	40	60	100
2	19BT51202	Web Technologies	3	-	-	3	3	40	60	100
3	19BT51501	Computer Networks with Systems Approach	3	-	-	3	3	40	60	100
	Professional Elective-1									
4	19BT30501	Computer Graphics	3	-	-	3	3	40	60	100
	19BT51502	Computational Statistics								
	19BT51503	Modern Cryptography								
	19BT51504	Natural Language Processing								
	19BT51505	Parallel Computer Architectures								
5		**Open Elective-1**	3	-	-	3	3	40	60	100
6	**Open-Elective-3 (Inter Disciplinary Elective-1)**		3	-	-	3	3	40	60	100
	19BT50201	Control Systems								
	19BT60313	Optimization Techniques								
	19BT50441	Microprocessors and Interfacing								
	19BT61041	Sensors and Applications								
7	19BT51232	Web Technologies Lab	-	-	2	2	1	50	50	100
8	19BT51531	Computer Networks with Systems Approach Lab	-	-	2	2	1	50	50	100
9	19BT51532	Socially Relevant Project-1	-	-	-	-	1	50	50	100
		Total:	**18**	**-**	**4**	**22**	**21**	**390**	**510**	**900**
10	19BT5MC01	Universal Human Values	2	-	-	2	-	40	--	40

III B. Tech. – II Semester

Sl. No.	Course Code	Course Title	L	T	P	Total	C	Int. Marks	Ext. Marks	Total Marks
			Contact Periods per week					Scheme of Examination Max. Marks		
1	19BT6HS02	Organizational Behavior	3	-	-	3	3	40	60	100
2	19BT60501	Compiler Design	3	-	-	3	3	40	60	100
3	19BT51201	Data Warehousing and Data Mining	3	-	-	3	3	40	60	100
4	**Professional Elective-2**		3	-	-	3	3	40	60	100
	19BT60504	Soft Computing								
	19BT60541	Ad Hoc and Wireless Sensor networks								
	19BT51203	Advanced Databases								
	19BT61205	.Net Technologies								
	19BT61501	Parallel and Distributed Systems								
5	**Professional Elective-3**		3	-	-	3	3	40	60	100
	19BT70503	Data Science								
	19BT61502	High Performance Computing								
	19BT61503	Information Security and Privacy								
	19BT61504	Systems Engineering								
	19BT61505	User Interface Design								
6	**Open-Elective-4 (Inter Disciplinary Elective-2)**		3	-	-	3	3	40	60	100
	19BT60317	Industrial Internet of Things								
	19BT60407	Image Processing								
	19BT60441	Pattern Recognition								
	19BT70401	Embedded Systems								
7	19BT51231	Data Warehousing and Data Mining Lab	-	-	2	2	1	50	50	100
8	19BT61531	Internet of Things Lab	-	1	2	3	2	50	50	100
9	19BT61532	Socially Relevant Project-2	-	-	-	-	1	50	50	100
		Total:	**18**	**1**	**4**	**23**	**22**	**390**	**510**	**900**
10	19BT503AC	Foundations of Entrepreneurship	2	-	-	2	-	--	--	--

IV B. Tech. – I Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT6HS01	Principles of Business Economics and Accountancy	3	-	-	3	3	40	60	100
2	19BT50501	Machine Learning	3	–	–	3	3	40	60	100
3	19BT71501	System Simulation and Modeling	3	-	-	3	3	40	60	100
4	**Professional Elective–4**		3	-	-	3	3	40	60	100
	19BT50504	Cyber Security								
	19BT61201	Cloud Computing								
	19BT71203	Big Data Technologies								
	19BT71502	Performance Evaluation of Computer Systems								
	19BT71503	Software Testing								
5	**Professional Elective–5**		3	-	-	3	3	40	60	100
	19BT70502	Augmented Reality and Virtual Reality								
	19BT70504	Blockchain Technologies								
	19BT71504	Data Visualization Techniques								
	19BT71505	Deep Learning								
	19BT71506	Robotics and Intelligent Systems								
6	19BT7MOOC	Open Elective–5 (MOOC)	-	-	-	-	3	--	100	100
7	19BT50531	Machine Learning Lab	-	-	2	2	1	50	50	100
8	19BT71531	System Simulation and Modeling Lab	-	-	2	2	1	50	50	100
9	19BT71532	Internship	-	-	-	-	2	--	100	100
		Total:	**15**	**-**	**4**	**19**	**22**	**300**	**600**	**900**
10	19BT715AC	Kernel Programming	-	-	2	2	–	–	–	–

IV B.Tech. – II Semester

Sl. No.	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
1	19BT81531	Project Work	-	-	-	-	10	100	100	200
		Total:	-	-	-	-	10	100	100	200

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

Course Code	Open Elective -1	Course Code	Open Elective -2
19BT4BS01	Material Science	19BT4HS01	Banking and Insurance
19BT4HS02	Business Communication and Career Skills	19BT4HS03	Cost Accounting and Financial Management
19BT4HS04	Entrepreneurship for Micro, Small and Medium Enterprises	19BT4HS05	Gender and Environment
19BT4HS06	German Language	19BT4HS07	Indian Economy
19BT4HS08	Indian History	19BT4HS09	Life Skills
19BT4HS10	Personality Development	19BT4HS11	Professional Ethics
19BT4HS12	Women Empowerment	19BT4HS13	Indian Tradition and Culture
19BT4HS14	Constitution of India	19BT40106	Disaster Mitigation and Management
19BT40205	Reliability and Safety Engineering	19BT40107	Sustainable Engineering
19BT50107	Environmental Pollution and Control	19BT40108	Contract Laws and Regulations
19BT50108	Planning for Sustainable Development	19BT40306	Global Strategy and Technology
19BT50109	Rural Technology	19BT40307	Management Science
19BT50505	Ethical Hacking	19BT40504	Cyber Laws and Security
19BT51207	AI in Healthcare	19BT50208	Intellectual Property Rights
19BT51506	Bioinformatics	19BT50409	Green Technologies

MINOR/HONORS DEGREE
IN
CYBER SECURITY

Semester	Course Code	Course Title	Contact Periods per week				C	Scheme of Examination Max. Marks		
			L	T	P	Total		Int. Marks	Ext. Marks	Total Marks
III B.Tech. I Semester	19BT51503	Modern Cryptography	3	-	-	3	3	40	60	100
	19BT51507	Digital Forensics	3	-	-	3	3	40	60	100
	19BT51508	Malware and Risk Analysis	3	-	-	3	3	40	60	100
	19BT51533	Cryptography Lab	-	-	2	2	1	50	50	100
III B.Tech. II Semester	19BT61503	Information Security and Privacy	3	-	-	3	3	40	60	100
	19BT61506	Software Security	3	-	-	3	3	40	60	100
	19BT61507	Cloud security	3	-	-	3	3	40	60	100
	19BT61508	IoT Security	3	-	-	3	3	40	60	100
	19BT6CB31	Information Security and Privacy Lab	-	-	2	2	1	50	50	100
IV B.Tech. I Semester	19BT70504	Blockchain Technologies	3	-	-	3	3	40	60	100
	19BT71507	Database and Web Security	3	-	-	3	3	40	60	100
	19BT71533	Database and Web Security Lab	-	-	2	2	1	50	50	100

Note: If any of the student has chosen a CORE course from the above list in their curriculum then, he/she is not eligible to opt the same course/s for the Minor/Honor degree.

I B. Tech. - I Semester

(19BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS

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

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

PRE-REQUISITES: -

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

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

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

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

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

DETAILED SYLLABUS:

Unit I: Ordinary Differential Equations   (9 Periods)

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

Unit II: Partial Differential Equations   (9 Periods)

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

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

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

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

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

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

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

Total Periods: 45

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
(19BT1BS04) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE and IT)

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

PRE-REQUISITES: -

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

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

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

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

Unit III: Electrochemistry and Applications   (10 Periods)

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

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

Unit IV: Instrumental Methods and Applications   (9 Periods)

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

Unit V: Fuel chemistry and Lubricants   (8 Periods)

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

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

Total Periods: 45

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. – I Semester

(19BT1HS01) COMMUNICATIVE ENGLISH

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

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

PRE-REQUISITES: -

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

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

CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

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

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

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

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO COMMUNICATION   (9 Periods)

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

UNIT II - ACTIVE LISTENING   (9 Periods)

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

UNIT III - EFFECTIVE SPEAKING   (9 Periods)

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

UNIT IV - READING   (9 Periods)

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

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

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

Total Periods: 45

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. – I Semester

(19BT10501) PROGRAMMING FOR PROBLEM SOLVING

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

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

PRE-REQUISITES: A course on Basic Mathematics

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

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

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

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

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

(10 periods)

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

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

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

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

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

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

(9 periods)

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

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

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

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

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

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

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

Total Periods: 45

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. - I Semester
(19BT1BS32) ENGINEERING CHEMISTRY LAB
(Common to CE, ME, CSE, CSSE and IT)

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

PRE-REQUISITES: -

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

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

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

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

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

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

List of Experiments

1. Estimation of Hardness of water by EDTA method
2. Determination of alkalinity of Water sample
3. Estimation of Dissolved Oxygen in water by Winkler's method.
4. Estimation Fe (II) by Dichrometry
5. Conductometric titration of strong acid Vs strong base
6. Estimation of Ferrous ion by Potentiometry
7. Determination of strength of acid by P^H metric method
8. Determination of Strength of an acid in Pb-Acid battery
9. Determination of Viscosity by Ostwald's viscometer
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of residual chlorine in drinking water.
12. Identification of simple organic compounds by UV-Vis and IR spectroscopy

TEXT BOOKS:

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

I B. Tech.-I Semester

(19BT1HS31) COMMUNICATIVE ENGLISH LAB

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

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

PRE-REQUISITES: -

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

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

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.

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

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

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

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

*First ten exercises are mandatory among the following:

List of Exercises:

1. **Just a Minute, Elocution/Impromptu**

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

2. **Phonetics**

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

3. **Vocabulary Building**

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

4. **Grammar**

   Tenses –Nouns – Word order and error correction

5. **Giving Directions**

   Useful phrases – Sample conversations - Exercises

6. **Role Plays**

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

7. **Public Speaking**

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

8. **Letter Writing**

   Introduction – Objective – Formats – Types – Exercises

9. **Describing Objects**

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

10. **Listening Comprehension**

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

11. **Information Transfer**

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

12. **Reading Comprehension**

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

TEXT BOOK:
1. **Communicative English Lab Manual (SVEC-19)**

REFERENCE BOOKS:
1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson, Noida, 2010.
2. Nira Kumar, English *Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:
1. SoftX
2. Speech Solutions
3. English Pronunciation Dictionary by Daniel Jones
4. Learning to Speak English 8.1, The Learning Company – 4 CDs.
5. Mastering English: Grammar, Punctuation and Composition.
6. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
7. Dorling Kindersley Series of Grammar.
8. Language in Use 1, 2 & 3
9. Cambridge Advanced Learner's Dictionary - 3rd Edition
10. Centronix – Phonetics
11. Let's Talk English, Regional Institute of English South India.

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

I B. Tech. – I Semester
(19BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to CE, ME, CSE, CSSE and IT)

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

PRE-REQUISITES: - -

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

COURSE OUTCOMES: After successful completion of this 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. – I Semester
(19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: A course on Basic Mathematics

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

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

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

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

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

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

PRACTICAL EXERCISES:

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

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

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

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

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

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

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

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

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

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

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

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

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

b) Print the following pattern using python script.

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

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

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

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

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

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

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

>>>primesquare([4])

True

>>>primesquare([4,5,16,101,64])

True

>>>primesquare([5,16,101,36,27])

False

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

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

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

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

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

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

b) Draw histograms by considering an appropriate data set.

11) **Mini Project-1**

12) **Mini Project-2**

TEXT BOOK:

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

I B. Tech. - II Semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: -

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

Total Periods: 45

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
(19BT1BS02) BIOLOGY FOR ENGINEERS
(Common to CE, ME, CSE, CSSE, IT and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

DETAILED SYLLABUS:

UNIT I – Living Organisms **(6 Periods)**

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

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

Bio molecules, 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. - II Semester
(19BT1BS03) ENGINEERING PHYSICS
(Common to CSE, CSSE and IT)

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 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 an 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, 2nd edition, 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. – II Semester
(19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, CSE, CSSE and IT)

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

PRE-REQUISITES: -

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

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

CO1: Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems

CO2: Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

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 Mc Graw-Hill Education, New Delhi, 2007.

2. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th edition, 2011.

I B. Tech. – II Semester
(19BT20501) DIGITAL LOGIC DESIGN
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.

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

CO1: Apply knowledge of binary systems, logic gates and Boolean functions to minimize and implement digital circuits.

CO2: Develop digital systems using combinational and sequential logic to solve engineering problems.

DETAILED SYLLABUS:

UNIT- I: BINARY SYSTEMS AND BOOLEAN ALGEBRA   (10 periods)

Introduction, Binary Numbers, Number Base Conversions, Error Detection and Correction, Complements of Numbers, Signed Binary Numbers, Binary Codes, Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates.

UNIT-II: GATE LEVEL MINIMIZATION   (9 periods)

The Map Method, Four Variable K-Map, Product-of-Sums and Sum-of-Products Simplification, Don't Care Conditions, NAND and NOR Implementations, Other Two Level Implementations, Exclusive–OR function.

UNIT-III: COMBINATIONAL LOGIC   (9 periods)

Combinational Circuits, Analysis of Combinational Circuits, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-Multiplexers.

UNIT-IV: SEQUENTIAL LOGIC   (10 periods)

Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, Design of Synchronous Sequential Circuits, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter and Johnson Counter.

UNIT-V: PROGRAMMABLE LOGIC   **(7 periods)**

Programmable Memories – RAM, ROM, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK:

1. M. Morris Mano, Michael D. Ciletti, *Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog*, 6th edition, Pearson, 2018.

REFERENCE BOOKS:

1. A. Anand Kumar, *Switching Theory and Logic Design*, 3rd edition, PHI Learning Private Limited, India, 2016.

2. Charles H. Roth, Jr. and Larry L. Kinney, *Fundamentals of Logic Design*, 7th edition, Cengage Learning, 2015.

3. Alan B. Marcovitz, *Introduction to Logic Design*, 3rd edition, McGraw Hill, 2010.

I B. Tech. – II Semester

(19BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: A course on Programming for Problem Solving

COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.

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

CO1: Demonstrate knowledge on object oriented programming constructs to solve programming problems.

CO2: Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.

CO3: Develop user interfaces using GUI programming techniques.

DETAILED SYLLABUS:

UNIT I : INTRODUCTION   (9 periods)

Introduction to Object Oriented Programming, Java Buzzwords, History, Java Environment, Java Components, Programming Paradigms, Naming Conventions.

Classes and Objects: Introduction to classes, objects, Constructors, Garbage Collection, this keyword, Access Control, Features of Object Oriented Programming.

UNIT II: DATA TYPES, CONTROL STATEMENTS, POLYMORPHISM   (9 periods)

Data Types, Variables, Type Conversions (Boxing and Unboxing/Wrapping and Unwrapping) and Casting, Arrays, Operators, Decision Making Statements, Looping Statements, Methods, Recursion, Method Overloading, Constructor Overloading, Parameter Passing, String Class, Final Keyword.

Utility Classes: String Tokenizer, Scanner, Random, Bit Set.

UNIT III : INHERITANCE, PACKAGES, INTERFACES   (9 periods)

INHERITANCE: Introduction, Classification, Abstract Classes, Final keyword with Inheritance.

PACKAGES: Basics, Creating and Accessing a package, CLASSPATH, Importing packages.

INTERFACES: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT IV: EXCEPTION HANDLING, MULTITHREADING, COLLECTION FRAMEWORK
                                                                        (9 periods)

EXCEPTION HANDLING: Exception, Types of Exception, Keywords: try, catch, throw, throws and finally, Built-in Exceptions, User Defined Exceptions.

MULTITHREADING: Process, Thread, Thread Model, Creating a thread, Priorities, Thread Synchronization, Inter-thread Communication.

COLLECTION FRAMEWORK: Framework Hierarchy, ArrayList, LinkedList, HashSet.

UNIT V – APPLETS, SWINGS, EVENT HANDLING   **(9 periods)**

APPLET CLASS: Basics, Types, Architecture, Skeleton, Parameter passing to applets.

SWINGS: Introduction, Features, Hierarchy, Swing GUI Components, Packages in Swings, Swing Control Classes and Methods.

EVENT HANDLING: Event Classes, Event Listener Interfaces - Mouse and Key, Adapter Classes.

                                                              Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Herbert Schildt, *Java the Complete Reference*, 9th edition, Oracle Press, 2014.

REFERENCE BOOKS:

1. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, 2nd edition, Oxford University press, 2014.
2. Y. Daniel Liang, *Introduction to Java Programming,* Pearson Education.
3. T. Budd, *Understanding Object-Oriented Programming with Java,* Pearson Education.

ADDITIONAL LEARNING RESOURCES

 https://docs.oracle.com/javase/tutorial/index.html

I B. Tech. - II Semester
(19BT1BS31) ENGINEERING PHYSICS LAB
(Common to CSE, CSSE and IT)

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.

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

List of Engineering Physics Experiments:

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. – II Semester

(19BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

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

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

PRE-REQUISITES: Physics at intermediate level.

COURSE 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. – II Semester
(19BT20331) ENGINEERING WORKSHOP
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: --

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

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

CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

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

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

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

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

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

DETAILED SYLLABUS:

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

List of Exercises :

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

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

List of Exercises:

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

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

List of Exercises:

7. Fabricate a rectangular tray as per the dimensions

8. Fabricate square vessel/cylinder as per the dimensions

9. Fabricate a Funnel as per the dimensions

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

List of Exercises:

10. Prepare a sand mold, using the given single piece pattern (stepped pulley/cube)

11. Prepare a sand mold, using the given split piece pattern (pipe bent/dumbbell)

DEMONSTRATION:

12. Demonstrate the dismantling and assembling of various two wheeler parts

13. Demonstrate the usage of power tools.

14. Demonstrate the plumbing operation and identify the essential tool and materials required for plumbing.

15. Demonstrate the working of 3D printer

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

REFERENCE BOOKS/LABORATORY MANUALS:

1. P. Kannaiah and K. L. Narayana, *Workshop Manual*, SciTech Publishers, 2009.

2. K. Venkata Reddy, *Workshop Practice Manual*, BS Publications, 2008.

3. V. Ramesh Babu, *Engineering Workshop Practice*, V R B Publishers Private Limited, 2009.

ADDITIONAL LEARNING RESOURCES:

1. R. K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012.

2. Kalpakjian, Serope, *Manufacturing Engineering and Technology*, Pearson Education, 7th edition, 2014.

I B. Tech. – II Semester

(19BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: A course on OOPS through Java.

COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; Applets, swings.

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

CO1: Apply syntactic constructs of the JAVA programming language to solve logic based problems

CO2: Develop application programs using concepts of object oriented programming.

CO3: Function effectively as an individual and on terms to solve problems with effective communication.

CO4: Write and prepare mini project reports/ documents effectively.

LIST OF EXERCISES:

1   Demonstrate the following programs using command line arguments:

    A   Write a program that computes the sum of all its integer arguments

    B   Write a program to input n integers and perform sorting between them.

2   A   The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 0, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?

    B   Write a program to define a class student with name, registration number and marks for three subjects as instance variables and describe a constructor to initialize them. Also define a method display to print all the values.

3   A   Write a program to print the element of an array that has occurred highest number of times.

    B   Write a program that displays a menu with options 1. Add 2. Sub. Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate. [Use Scanner class]

4   A   Write a Program to count tokens- number of words and characters in a string.

    B   Write and test overloaded methods to find sum of three integers, sum of three double values and sum of four integers.

5   A   Write a program to create an abstract class named Shape that contains an empty method named numberOfSides ( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.

	B	Write a program that imports the User-defined package P1 and access the member variables and methods of classes that contained in the package P1.
6		A University awards some grace marks to students who participate in the Inter University games. Therefore, total marks awarded = Exam_Marks +Sports_Grace_Marks. If total marks scored are greater than maximum marks, then the final marks awarded will be equal to the maximum marks. An Object Oriented based implementation will contain a class called Results, which extends a class called Exam, which itself extends a class called Student. It will also contain an interface called Sports, which is implemented by the Results class. The Results class will be responsible for computing the final marks scored by the students. Write a Java program along with an interactive driver class.
7	A	Write a program to handle Arithmetic Exception, Array Out Of Bounds Exception using try and multiple catch statements.
	B	Write a java program to throw a user defined exception called Negative, if the entered input is a negative number.
8	A	Write a Java program that creates three threads. First thread displays - Good Morning for every one second, the second thread displays - Hello for every two seconds and the third thread displays - Welcome for every three seconds.
	B	Write a Java program that correctly implements producer consumer problem using the concept of inter-thread communication.
9	A	Write a program create a class "Book" with name, id, author, publisher and quantity as instance variables and a constructor to initialize them. Create a HashSet object of type Book and three Book instances b1, b2 and b3. Add these instances into HashSet and display them.
	B	Develop an Applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
10	A	Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
	B	Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.
11		Write a java program that handles all mouse and key events and shows the event name at the center of the window when mouse event is fired (Use Adapter classes).

Mini Project 1:

Given coordinates of the box, radius of the circle and color, using these elements design an animation of a bouncing ball using Java applet program.

Mini Project 2:

Design and implement a simple Inventory Control System for a small Video Rental Store using appropriate User-Interface. Define the following classes: **Video** to model a video and **VideoStore** to model the actual store. Assume following are the attributes of the class **Video**: title, user_rating, a flag to say whether it is checked out or not and define required member methods. The **VideoStore** class will contain an instance variables that refers an array of

videos (say of length 10) and the following member functions: add Video(String), checkout(String), return Video(String), receiveRating(String) and list Inventory(). Finally create a **VideoStore Launcher** class with a main method which will test the functionality.

REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference*, Ninth Edition, Oracle Press, 2014.

2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Second Edition, Oxford University Press, 2014.

SOFTWARES/Tools used:

Java SE 12.0.1

ADDITIONAL LEARNING RESOURCES

Problems to be considered from Hackerearth and CodeChef platforms

I B. Tech. - II Semester
(19BT1AC01) **SPOKEN ENGLISH**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT and CSBS)

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

PRE-REQUISITES: -

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

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

CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

Total Periods: 30

Topics for Self Study are provided in Lesson Plan

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

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

II B. Tech. - I Semester

(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**

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

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

PRE-REQUISITES: -

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

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

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

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

DETAILED SYLLABUS

UNIT-I: NUMERICAL SOLUTIONS OF EQUATIONS AND INTERPOLATION

(8 Periods)

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

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

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

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

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

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

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

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCE BOOKS:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th edition, 2017.

2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, *Numerical Methods*, S. Chand and Company, 2nd edition, Reprint 2012.

3. S. C. Gupta and V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand and Sons Publications, 11th edition, 2012.

II B. Tech. -I Semester
(19BT30502) **COMPUTER ORGANIZATION**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: A course on "Digital Logic Design"

COURSE DESCRIPTION:

Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques; Multicore computers.

COURSE OUTCOMES:

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

CO1: Analyze computer arithmetic algorithms for fixed-point and floating-point binary operations.

CO2: Analyze the architecture, organization and functions of the components of a digital computer.

CO3: Design digital circuits for the given functional description of micro operations and memory elements.

CO4: Investigate the performance of memory systems, I/O systems, pipelined processors and multiprocessors to evaluate the cost-performance trade-offs.

DETAILED SYLLABUS:

UNITI -COMPUTER ARITHMETICANDREGISTER TRANSFER& MICROOPERATIONS
(9 periods)

Computer Arithmetic: Fixed point representation, Floating point representation, Addition and subtraction, Binary multiplication algorithms

Register Transfer & Micro operations: Register transfer, Bus and memory transfers, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic logic shift unit.

UNIT II - BASIC COMPUTER ORGANIZATION AND DESIGN **(8 periods)**

Instruction codes, Computer registers, Computer instructions, Instruction formats, Addressing modes, Timing and control, Instruction cycle, Input-Output and Interrupt.

UNIT III - MICRO PROGRAMMED CONTROL AND INPUT-OUTPUT ORGANIZATION
(10 periods)

Micro Programmed Control: Control memory, Address sequencing, Design of control unit, Hardwired control, Microprogrammed control.

Input-Output Organization: Peripheral devices, Input-Output interface, Modes of transfer, Priority interrupt – Daisy chaining priority, Parallel priority interrupt, Priority encoder; Direct Memory Access, Input-Output Processor – CPU-IOP communication; PCI Express - PCI physical and logical architecture.

UNIT IV -THE MEMORY SYSTEM **(9 periods)**

Semiconductor RAM memories – Internal organization, Static memories, Dynamic RAMs, Synchronous and Asynchronous DRAMs, Structure of larger memories; Read-only memories, Cache memories – Mapping functions; Nonvolatile Solid-State Memory Technologies, Solid state drives.

UNITV - PIPELINE AND VECTOR PROCESSING, MULTIPROCESSORS, MULTICORE COMPUTERS **(9 periods)**

Pipeline & Vector Processing: Parallel processing, Pipelining, Instruction pipeline, Vector processing, Array processors.

Multiprocessors: Characteristics of multiprocessors, Interconnection structures, Inter-processor arbitration.

Multicore Computers: Hardware performance issues, Software performance issues, Multicore organization, Intel Core i7-990X.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. M. Morris Mano, Rajib Mall, *Computer System Architecture*, Revised 3rd Edition,Pearson Education, 2017.

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky,Naraig Manjikian,*Computer Organization and Embedded Systems*,6th Edition, McGrawHill, 2012.

REFERENCE BOOKS:

1. William Stallings, *Computer Organization and Architecture: Designing for Performance*, 11th Edition, Pearson Education, 2018.

2. Andrew S. Tanenbaum, Todd Austin, *StructuredComputer Organization*, 6th Edition, Pearson, 2016.

ADDITIONAL LEARNING RESOURCES:

- https://nptel.ac.in/courses/106105163/

- Bilkent Online Courses, Bilkent University, Lectures by William Sawyer, https://www.youtube.com/watch?v=CDO28Esqmcg

II B. Tech. I Semester
(19BT31201) DISCRETE MATHEMATICAL STRUCTURES
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: A Course on Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION: Mathematical Logic; Predicates; Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

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

CO1: Demonstrate knowledge on mathematical logic and predicates.

CO2: Analyze sets using functions and relations.

CO3: Analyze properties of different algebraic structures.

CO4: Apply mathematical reasoning, recurrence relations, permutations and combinations to solve computational problems.

CO5: Apply concepts of graph theory and trees to implement computer applications.

DETAILED SYLLABUS:

UNIT–I: MATHEMATICAL LOGIC AND PREDICATES **(10 periods)**

Mathematical Logic: Statements and notations, Connectives, Well formed formulae, Truth tables, Tautology, Equivalence of formulae, Normal forms.

Predicates: Predicate calculus, Free and Bound variables, Rules of inference, Consistency, Proof of contradiction and Automatic Theorem Proving.

UNIT-II: FUNCTIONS AND RELATIONS **(09 periods)**

Relations: Properties of binary relations, Equivalence relations, Compatibility relations, Partial ordering relations, Hasse diagram and related applications.

Functions: Inverse Functions, Composition of functions, Recursive functions, Lattice and its Properties.

UNIT-III: ALGEBRAIC STRUCTURES **(07 periods)**

Algebraic System: Examples and General Properties, Semi Groups and Monoids, Groups, Subgroups, Homomorphism and Isomorphism.

UNIT-IV: MATHEMATICAL REASONING AND RECURRENCE RELATIONS

(10 periods)

Mathematical Reasoning: Methods of Proof, Mathematical Induction, Basics of counting, The Inclusion-Exclusion Principle, The Pigeon hole principle, Permutations and Combinations, Generalized Permutations and Combinations.

Recurrence Relations: Generating Functions of Sequences, Calculating coefficients of generating function, Recurrence relation, solving recurrence relations by substitution and Generating functions, Methods of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relation.

UNIT-V: GRAPH THEORY AND ITS APPLICATION   **(09 periods)**

Graphs: Introduction to Graphs, Types of Graphs, Graph basic terminology and Special types of simple graphs, Representation of Graphs and Graph Isomorphism, Euler Paths and Circuits, Hamiltonian Paths and Circuits, Planar Graphs, Euler's Formula and Graph Coloring.

Trees: Introduction to Trees, Properties of Trees, Applications of Trees, Spanning Trees, Counting trees, Depth-First Search, Breadth-First Search, Minimum Spanning Trees, Kruskal's Algorithm and Prim's Algorithm.

Total Periods 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. J.P. Trembly and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science,* Tata McGraw Hill, Thirty Seventh Edition, 2017

2. Kenneth H. Rosen, *Discrete Mathematics and its Applications,* Tata McGraw Hill, Sixth Edition, 2007.

REFERENCE BOOKS:

1. Joe L. Mott and Abraham Kandel, *Discrete Mathematics for Computer Scientists and Mathematicians,* Prentice Hall of India Private Limited, Second Edition, 2004.

2. Ralph P. Grimaldi and B.V.Ramana, *Discrete and Combinatorial Mathematics - an Applied Introduction,* Pearson Education, Fifth Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. https://www.maa.org/press/ebooks/resources-for-teaching-discrete-mathematics.

2. https://www.quora.com/

II B. Tech. – I Semester
(19BT31501) DATA STRUCTURES AND ALGORITHMS

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

PRE-REQUISITES: A Course on "Object Oriented Programming"

COURSE DESCRIPTION:

Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing

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

CO1: Understand the fundamental concepts of data structures, asymptotic notations and Algorithm analysis techniques to measure the performance of an algorithm.

CO2: Analyze performance of sorting and searching algorithms by making use of time and space complexity.

CO3: Design algorithms to solve societal problems by applying contextual knowledge on linked lists

CO4: Solve computational problems by using stacks and queues

CO5: Apply suitable data structure to perform operations on trees and graphs

CO6: Construct hash tables by using Hash functions and relevant collision resolution technique.

DETAILED SYLLABUS:

UNIT I– Introduction, Sorting and Searching   (11 periods)

Introduction: Introduction to data structures, Introduction to Algorithm, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notation- Big Oh, Omega, Theta notations, Guidelines for Asymptotic Analysis, Algorithms Analysis: Problems & Solutions.

Sorting: Bubble Sort**,** Insertion sort, Selection Sort, Shell Sort, Radix sort and their performance analysis

Searching: Linear Search, Binary Search and their performance analysis

UNIT II – Linked List   (8 periods)

Single Linked List, Circular Linked List, Double Linked List, Circular Double Linked List, Applications of Linked List- Sparse Matrix Representation and its performance analysis, Addition of Polynomials and its performance analysis

UNIT III – Stacks and Queues   (8 periods)

Stacks: Introduction, Definition, Implementation of stacks using arrays, Implementation of stacks using linked list, Applications of Stacks

Queues: Introduction, Definition, Implementation of queues using arrays, Implementation of queues using linked list, Circular Queue, Deque, Priority Queue, Applications of Queues

UNIT IV – Trees, Search Trees and Heaps   (9 periods)

Trees: Basic Terminologies, binary trees, Properties of binary tree, Representation of Binary Tree, Binary tree traversals.

Search Trees: Binary Search Trees, Operations on Binary Search Trees, AVL Trees and Operations on AVL trees

Heap: Heap Trees, Implementation of Heap Trees, Applications of Heap – Heap Sort and Its performance Analysis

UNIT V – Multi way Trees, Graphs and hashing   (9 periods)

Multiway Trees: M-way search trees, B-trees, Operations on B-trees, B+-trees

Graphs: Introduction, Basic Terminologies, Representation of Graphs, Breadth First Search and its Complexity Analysis, Depth First Search and its Complexity Analysis

Hashing: Introduction, Hash Table Structure, Hash Functions, Linear Open Addressing, Chaining and their performance analysis.

Total Periods: *45*

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Debasis Samanta, Classic Data Structures, PHI Learning private limited, Second Edition, 2017

2. Narasimha Karumanchi, Data Structures and Algorithms made easy, Career Monk, 5th Edition, 2017

REFERENCE BOOKS:

1. G A V Pai, Data Structures and Algorithms: Concepts, Techniques and Applications,Mc graw Hill Edition

2. Satraj Sahani, Data Structures, Algorithms and Applications in Java, Universities Press, Second Edition, 2008

3. Michael T. Goodrich, Roberto Tamassia, Data Structures and Algorithms in java, Wiley India, Second Edition, 2007

ADDITIONAL LEARNING RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos

2. http://nptel.ac.in/courses/106106127/

3. http://www.nptel.ac.in/courses/106102064

II B. Tech. – I Semester
(19BT31502) OPERATING SYSTEMS
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES:- A course on "Computer Organization"

COURSE DESCRIPTION: Operating Systems Operations; Process Scheduling; Process Synchronization, Deadlocks; Paging and Segmentation, Disk Scheduling; File Concepts, I/O Interface; Concepts of Protection and Security.

COURSE OUTCOMES:

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

CO1: Analyze performance of CPU scheduling algorithms.

CO2: Design solutions for process synchronization problems by using semaphores and monitors.

CO3: Devise solutions for deadlocks using deadlock handling mechanisms.

CO4: Solve memory management problems using page replacement and disk scheduling algorithms.

CO5: Identify efficient file allocation methods for optimal disk utilization.

CO6: Analyze services of I/O subsystems and mechanisms of security & protection.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION TO OPERATING SYSTEM AND PROCESS MANAGEMENT

(8 periods)

INTRODUCTION: Definition, Operating System Structure and Services: Layered approach, Hybrid Systems :Mac OSX, iOS, Android, System Calls.

PROCESS MANAGEMENT: Process Scheduling, Process Control Block, Inter Process Communication, Threads, Multithreading Models, CPU Scheduling Criteria, Scheduling Algorithms, Multiprocessor Scheduling.

UNIT II: PROCESS SYNCHRONIZATION AND DEADLOCKS   (10 periods)

PROCESS SYNCHRONIZATION: Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Synchronization Problems, Monitors.

DEADLOCKS: System Model, Deadlock characterization, Methods for handling deadlocks, Prevention, Detection, Avoidance, Recovery from deadlock.

UNIT III:MEMORY MANAGEMENT AND SECONDARY STORAGE   (10 periods)

MEMORY MANAGEMENT: Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging.

VIRTUAL MEMORY: Demand Paging, Page Replacement Algorithms, Copy-on-Write, Thrashing.

SECONDARY STORAGE STRUCTURE: Overview of Mass Storage Structure, Disk Structure, Disk Scheduling, Disk Management.

UNIT IV: File and I/O Systems   (8 periods)

FILE SYSTEM: File concept, Access Methods, Directory Structure, File System Structure, i-node, File System Implementation, Directory Implementation, Allocation Methods.

I/O SYSTEM: I/O Hardware, Application I/O Interface, Kernel I/O subsystem

UNIT V – PROTECTION AND SECURITY   (9 periods)

PROTECTION: Goals, Principles, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights.

SECURITY: Security Problem, Program Threats, System and Network Threats, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer-Security Classifications.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, *Operating System Concepts*, Wiley India Edition, 9th Edition, 2016.

REFERENCE BOOKS:

1. William Stallings, *Operating Systems, Internals and Design Principles*, Pearson Education, 7th Edition, 2013.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, PHI, 3rd Edition, 2009.

II B. Tech. – I Semester
(19BT31503) SYSTEM PROGRAMMING

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

PRE-REQUISITES:- -

COURSE DESCRIPTION: Synchronized I/O, Direct I/O, Buffered I/O, Scatter/Gather I/O, I/O Schedulers, Device Drivers, Kernel Modules, Debugging System

COURSE OUTCOMES:

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

CO1: Apply system programming APIs for performing operations on files.

CO2: Implement buffer through streams for interactive I/O management.

CO3: Analyze I/O performance using synchronous and asynchronous operations

CO4: Identify classes of device drivers and its security issues in kernel development

CO5: Build running modules for setting up a system using module parameters in the user space

CO6: Analyze different I/O operations and debugging techniques in the design of char drivers.

DETAILED SYLLABUS:

UNIT I: FILE I/O (8 periods)

Systems Programming, APIs, ABIs, Standards, Opening Files, Reading via read(),Writing with write(),Synchronized I/O, Direct I/O, Closing Files, Seeking with lseek(),Positional Reads and Writes, Truncating Files, Multiplexed I/O, Kernel Internals

UNIT II: BUFFERED I/O (9 periods)

User-Buffered I/O, Standard I/O, Opening Files, Opening a Stream via File Descriptor, Closing Streams, Reading from a Stream, Writing to a Stream, Sample Program Using Buffered I/O, Seeking a Stream, Flushing a Stream, Errors and End-of-File, Obtaining the Associated File Descriptor, Controlling the Buffering, Thread Safety, Critiques of Standard I/O

UNIT III: ADVANCED FILE I/O (8 periods)

Scatter/Gather I/O, The Event Poll Interface, Mapping Files into Memory, Advice for Normal File I/O, Synchronized, Synchronous, and Asynchronous Operations, I/O Schedulers and I/O Performance

UNIT IV:DEVICE DRIVERS AND RUNNING MODULES (10 periods)

The role of Device Driver, Splitting the kernel, Classes of Devices and Modules, Security Issues. Building and Running Modules: Kernel Modules versus Applications,The Kernel Symbol Table, Preliminaries, Initialization and shutdown, Doing it in user space.

UNIT V: CHAR DRIVERS AND DEBUGGING TECHNIQUES   **(10 periods)**

The Design of Scull, Some Important Data Structures, Char Device Registration, Open and Release, Scull's Memory Usage, Read and Write. Debugging Techniques: Debugging support in the Kernel, Debugging System faults, Debuggers and Related Tools.

                                                   Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Robert Love, Linux System Programming, O'Reilly Media, 2007.

2. Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman, LINUX Device Drivers, O'Reilly Media, Year: 2005

REFERENCE BOOKS:

1. 1.Dayanand Ambawade, Deven Shah, "Linux Labs and Open Source Technologies", Dreamtech Press, 2014.

2. 2.Venkateswaran S, "Essential Linux Device Drivers", Pearson Education, 2008

II B. Tech. – I Semester
(19BT31531) DATA STRUCTURES AND ALGORITHMS LAB

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

PRE-REQUISITES: A course on "Data Structures and Algorithms"

COURSE DESCRIPTION:

Sorting and Searching; Linked Lists; Stacks and Queues; Binary Search Trees; AVL trees; Graph Traversing Techniques; Collision Resolution Techniques

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

CO1: Implement sorting and searching algorithms using suitable data structure.

CO2: Develop algorithms to solve real time problems using Linked lists

CO3: Solve computational problems using stacks and queues

CO4: Develop algorithms to perform operations on trees and graphs

CO5: Build solution for collisions in hash tables using suitable data structure

CO6: Work independently and in team to solve problems with effective communication

List of Exercises/List of Experiments:

1. Implement following sorting algorithms
     a) Bubble Sort
     b) Insertion sort
     c) Selection sort

2. Store roll numbers of students who attended placement training program in random order in an array.
     a) Write a program to search whether a particular student attended training or not using linear search
     b) Write a program to search whether a particular student attended training or not using binary search

3. **a)** Department of CSSE has readers club named 'Prerana'. Students of all years can be granted membership on request and they can get books. Similarly one may cancel the membership of club. First node is reserved for head of readers club and last node is reserved for in-charge of readers club. The student's information in each node consisting of name of the student and roll no of the student. Develop a program to perform following operations on readers club member's information using singly linked list.
       i) Add and delete the members as well as head or even in-charge.
       ii) Compute total number of members in readers club
       iii) Display members in readers club
       iv) Display list in reverse order using recursion
       v) Sort the list using name and display it.
    b) A Company has N employees and it maintains each employee data with the following attributes like: emp_id, emp-dept,emp_sal, emp_mobileno. Use a menu driven Program to perform following operations on employee's data using DoublyLinked List (DLL).
       i) Create a DLL of N Employees Data by using end insertion.
       ii) Display the status of DLL and count the number of nodes in it

     iii) Perform Insertion and Deletion at End of DLL

     iv) Perform Insertion and Deletion at Front of DLL

     v) Perform Insertion and Deletion at any user specified position of DLL

     vi) Exit

4. **a)** Implement a menu driven Program for the following operations on stack using arrays.

     i) Push an Element on to Stack

     ii) Pop an Element from Stack

     iii) Demonstrate how Stack can be used to check Palindrome

     iv) Display the elements of a Stack

     v) Exit

  b) Develop a menu driven program to implement queue operations using arrays

5. **a)** Write a program to implement stack using linked list

  b) Write a program to implement queue using linked list

6. **a)** Develop a program to convert an infix expression to postfix expression using stack

  b) Write a program to evaluate given postfix expression using stack

7. Develop a menu driven program to perform the following operations on a binary search tree

    a) Create a binary search tree

    b) Insert an element into a binary search tree

    c) Delete an element from binary search tree

    d) Traverse the binary search tree in Inorder, Preorder and post order

8. Write a program to perform the following operations on AVL tree

    a) Insert an element into AVL tree

    b) Delete an element from AVL tree

    c) Display the elements of AVL tree in ascending order

9. **a)** Develop a program to implement Breadth first search traversal.

  b) Develop a program to implement Depth first search traversal.

10. Write a program to implement hashing with

    a) Separate Chaining Method

    b) Open Addressing Method

REFERENCE BOOKS/LABORATORY MANUALS:

1. Debasis Samanta, Classic Data Structures,PHI Learning private limited, Second Edition, 2017

2. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education (2008)

ADDITIONAL LEARNING RESOURCES:

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos

2. http://nptel.ac.in/courses/106106127/

3. http://www.nptel.ac.in/courses/106102064

II B. Tech. – I Semester
(19BT31532) **OPERATING SYSTEMS LAB**
(Common to CSE, CSSE, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: A course on "Operating Systems."

COURSE DESCRIPTION: Hands-on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems;

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

CO1: Analyze process scheduling problems by applying contextual knowledge on CPU scheduling algorithms.

CO2: Apply memory management and disk scheduling algorithms to attain optimal solutions.

CO3: Devise solution for deadlock avoidance using banker's algorithm.

CO4: Design solutions for process synchronization problems using semaphores and monitors.

CO5: Apply file allocation strategies to achieve optimal disk utilization.

CO6: Work independently and in team to solve problems with effective communication

LIST OF EXPERIMENTS:

1   Simulate the following

   a) Process System Calls.

   b) I/O System Calls.

2   Simulate multi-level queue scheduling algorithm by considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. The priority of each process ranges from 1 to 3. Use fixed priority scheduling for all the processes.

3   Demonstrate File Permissions.

4   Simulate the following CPU Scheduling Algorithms:

   a) FCFS b) SJF (Preemptive) c) Priority d) Round Robin

5   Design solutions for the following synchronization problems:

   a) Producer Consumer Problem b) Dining Philosophers Problem.

6   Design Banker's Algorithm for Deadlock Avoidance. Find the safe sequence. If Maximum request of any one process is changed, detect whether a deadlock has occurred or not. Consider the number of resources are three and Jobs are five.

7   Simulate the following Algorithms:

    a) First Fit   b) Best Fit   c) Worst Fit

8   Simulate the following Page Replacement Algorithms

    a) FIFO   b) LFU   c) LRU   d) Optimal

9   Simulate the following Disk Scheduling Algorithms

    a) FCFS   b)SSTF   c) SCAN   d) CSCAN

10   Simulate the following file allocation strategies:

    a) Contiguous Allocation   b) Linked Allocation

REFERENCE BOOKS:

1. Herbert Schildt, *Java the Complete Reference*, Ninth Edition, Oracle Press, 2014.

2. Sachin Malhotra and Saurab Choudhary, *Programming in Java*, Second Edition, Oxford University press, 2014.

SOFTWARES/TOOLS USED:

- Software:J2SDK1.7

    -Eclipse or NetBeans IDE

- Java compatible web browser

II B. Tech. – I Semester

(19BT31533) **WORKSHOP IN COMPUTER SCIENCE AND SYSTEMS ENGINEERING**

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

PRE-REQUISITES: A course on "Programming for Problem Solving"

COURSE DESCRIPTION:

Hands-on practice PC Hardware; Installation of Operating System; Software and Hardware Troubleshooting; Microsoft Office- Word and Excel; C Language- Operators, Expressions, Decision Making Statements, Looping Statements, Arrays and Functions.

COURSE OUTCOMES:

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

CO1: Devise solutions to the basic problems using C Language constructs.

CO2: Solve problems by applying functions, structures, dynamic memory allocation and pointers.

CO3: Develop, maintain and modify Web pages effectively using markdown.

CO4: Design personal portfolioin customized style by using git and Jekyll themes.

CO5: Build simple mobile applications using MIT App inventor.

CO6: Work independently and communicate effectively in oral and written forms.

LIST OF EXPERIMENTS:

I: C Programming:

1 A Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.

i) $(ax+b)/(ax-b)$ 　　　　　ii) $2.5logx+Cos32^o+|x^2+y^2|+2xy$
iii) $x^5+10x^4+8x^3+4x+2$ 　　iv) ae^{kt}

B Write a program to calculate commission for the input value of sales amount. Commission is calculated as per the following rules:

i) Commission is **NIL** for sales amount Rs. 5000.

ii) Commission is 2% for sales when sales amount is >Rs. 5000 and <= Rs. 10000.

iii) Commission is 5% for sales amount >Rs. 10000.

2 A Write a program to find the grace marks for a studentusing switch. The user should enter the class obtained bythe student and the number of subjects he has failed in.

Use the following rules:

i. If the student gets first class and the number of subjectsfailed is >3, then no grace marks are awarded. If thenumber of subjects failed is less than or equal to '3' thenthe grace is 5 marks per subject.

ii. If the student gets second class and the number of subjectsfailed in is >2, then no grace marks are awarded. If thenumber of subjects failed in less

than or equal to '3' thenthe grace is 4 marks per subject.

iii. If the student gets third class and the number of subjectsfailed in is >1, then no grace marks are awarded. If thenumber of subjects failed in is equal to '1' then the graceis 5 marks per subject

B Write a program to find the sum of individual digits of a positive integer using for loop

3 **A** Write a program to generate all the prime numbers between 1 and N using while loop

B Write a program to generate Fibonacci sequence for N numbers using do-while loop.

4 **A** Write a program to perform the following: i) Addition of two matrices.

ii) Multiplication of two matrices.

B Write a program to implement (i) Call by value (ii) Call by reference.

5 **A** Write a program to find factorial of a given number using recursion.

B Write a program that uses functions to perform the followingoperations:

Write a program to determine whether the given string ispalindrome or not.

6 Define a structure to store employee's data with the following specifications:

Employee-Number, Employee-Name, Basic pay, Date of Joining

i. Write a function to store 10 employee details.

ii. Write a function to implement the following rules while revising the basic pay.

If Basic pay<=Rs.5000 then increase it by 15%.

If Basic pay> Rs.5000 and <=Rs.25000 then it increase by 10%.

If Basic pay>Rs.25000 then there is no change in basic pay.

Write a function to print the details of employees who have completed 20 years of service from the date of joining.

7 **A** Write a Program to calculate the sum of n numbers entered by the user using dynamic memory allocation functions.

B Write a Pointer Program to swap two numbers without using the 3rd variable.

II: Source Code Management Using Git and GitHub:

8 Installing Git, Configuring Git, Creating a Git repository, Creating and editing files, Adding files to Git repository, Making changes and tracking them, Synchronizing local Git repository with GitHub, Deleting and renaming files.

9 Markdown Syntax: Adding text of various styles and formats, Adding images along with text, Creating Ordered/Unordered list,

Adding videos/ pdfs to the markdown file, adding links in the markdown file.

10 GitHub Pages: Creation of personal portfolio site- Creating a GitHub Page using Markdown and Jekyll themes forrepositories.

III: Build Apps with MIT App Inventor:

11 Building the App "HelloCodi": Select components to design app, Programming with the Blocks Editor, Playing the Sound, Packaging app.

12 Building the simple Game APP "BallBounce".

13 Building the Drawing App "DigitalDoodle".

REFERENCE BOOKS:

MIT App Inventor:

1. http://appinventor.mit.edu/

GIT Hub:

1. Scott chacon, Ben Straub, "**Pro Git**", Second Edition, APress open, 2014.

C LANGUAGE:

1. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**," Third Edition, Cengage Learning, New Delhi, 2007.

2. PradipDey and ManasGhosh, "**Programming in C**," Second Edition, Oxford University Press, New Delhi, 2007.

SOFTWARES/Tools used:

System Software: C Compiler/Code Blocks, MIT App Inventor, Git hub.

II B.Tech. I Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)

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

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

PRE-REQUISITES: -

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

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

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

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

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

CO4: Build prototypes for complex problems using gathered user requirements.

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

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

DETAILED SYLLABUS:

UNITI: 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.

UNITI V: 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 the lesson plan

TEXTBOOKS:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.

2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly,2017.

REFERENCE BOOKS:

1. Michael G. Luchs, Scott Swan , Abbie Griffin,"Design Thinking – New Product Essentials from PDMA", Wiley, 2015.

2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

2. https://www.ibm.com/design/thinking/page/toolkit

3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we

4. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking

5. https://nptel.ac.in/courses/109/104/109104109/

6. https://nptel.ac.in/courses/110106124/

II B. Tech. - II Semester

(19BT40502) DATABASE MANAGEMENT SYSTEMS
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: A Course on "Data Structures"

COURSE DESCRIPTION:

Introduction to database systems, Database design, Relational model, Relational algebra, SQL queries, Constraints and triggers, PL/SQL, Schema refinement and normal Forms, Transaction management, Concurrency control, Overview of storage and indexing.

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

CO1: Apply the concepts of ER-modeling and normalization to design viable data models for a given problem.

CO2: Formulate relational database schemas, apply suitable integrity constraints, for querying databases.

CO3: Use SQL to store, query, and manipulate data in relational databases.

CO4: Develop PL/SQL blocks to centralize database applications for maintainability and reusability.

CO5: Analyze transaction processing, concurrency control and storage methods for database management.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO DATABASE SYSTEMS AND DATABASE DESIGN

(8 periods)

Introduction to Database Systems: Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and schemas, Data models; Database Languages – Data Definition Language, Data Manipulation Language; Database architecture, Database users and administrators.

Introduction to Database design: Database design and ER diagrams, Entities, attributes and entity sets, Relationships and relationship sets, Additional features of ER model, Conceptual Design with ER model.

UNIT II - RELATIONAL MODEL AND RELATIONAL ALGEBRA **(8 periods)**

Relational Model: Creating and modifying relations, Integrity constraints over relations, Enforcing integrity constraints, Querying relational data, Logical database design, Introduction to views, Destroying/altering tables and views.

Relational Algebra: Preliminaries, Relational Algebra Operators.

UNIT III - SQL AND PL/SQL **(10 periods)**

SQL: Form of basic SQL query, Nested queries, Aggregate operators, Null values, Complex integrity constraints in SQL, Triggers and active databases.

PL/SQL: Generic PL/SQL block, PL/SQL data types, control structure, procedures and functions, cursors, database triggers.

UNIT IV - SCHEMA REFINEMENT AND TRANSACTIONS   **(10 periods)**

Schema Refinement: Problems caused by redundancy, Decompositions, Problems related to decomposition, Functional dependencies, Reasoning about FDs, First normal form, Second normal form, Third normal form, Boyce-Codd normal form, Multivalued dependencies, Fourth normal form, Join dependencies, Fifth normal form.

Transactions: Transaction concept, Transaction atomicity and durability, Concurrent Executions – Serializability, Recoverability, Implementation of isolation, Testing for serializability.

UNIT V - CONCURRENCY CONTROL, STORAGE AND INDEXING   **(9 periods)**

Concurrency Control: Lock Based Protocols – Timestamp Based Protocols- Validation Based Protocols – Multiple Granularity, Deadlock Handling.

Storage and Indexing: Data on external storage, File organizations and indexing – Clustered indexes, Primary and secondary indexes; Index data structures – Hash based indexing, Tree based indexing; Comparison of file organizations.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Raghu Ramakrishnan, Johannes Gehrke,*Database Management Systems*, McGraw Hill, 3rd Edition, 2014.

2. Abraham Silberschatz, Henry. F. Korth, S. Sudarshan, *Database System Concepts*, McGraw Hill, 7th edition, 2019.

REFERENCE BOOKS:

1. Ivan Bayross,*SQL, PL/SQL: The Programming Language of Oracle*, BPB publications, 4th Edition, 2017.

2. RamezElmasri, ShamkantB.Navathe,*Fundamentals of Database Systems*, 7th Edition, Pearson, 2015.

ADDITIONAL LEARNING RESOURCES:

- https://swayam.gov.in/nd1_noc19_cs46/preview

- https://www.classcentral.com/course/swayam-introduction-to-database-systems-17660

II B. Tech.- II Semester

(19BT40503) DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: A Course on "Data Structures"

COURSE DESCRIPTION: Algorithms and asymptotic notations, Algorithm performance analysis, Amortized analysis, Recurrences, Disjoint sets, Divide and Conquer, Dynamic programming, Greedy algorithms, Back tracking, Branch and bound, NP-hard and NP-complete problems.

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

CO1: Analyze the complexity of algorithms by applying the knowledge of asymptotic notations and recurrence methods.

CO2: Analyze the given problem and identify appropriate algorithm design technique for problem solving.

CO3: Perceive and apply different algorithm design paradigms to find solutions for computing problems.

CO4: Apply the knowledge of NP-hard and NP-Complete complexity classes to classify decision problems.

DETAILED SYLLABUS:

UNIT I -INTRODUCTION TO ALGORITHMS   (10 periods)

Algorithm, Algorithm pseudocode conventions, Performance analysis - Space complexity, Time complexity, Asymptotic notations; Amortized analysis – Aggregate analysis, Accounting method, Potential method; Recurrences - Substitution method, Recursion-tree method, Master method.

UNIT II - DISJOINT SETS, DIVIDE AND CONQUER   (8 periods)

Disjoint Sets: Operations, Union and Find algorithms.

Divide and Conquer: General method, Defective chess board, Binary search, Finding maximum and minimum, Merge sort, Strassen's matrix multiplication.

UNIT III -DYNAMIC PROGRAMMING   (9 periods)

General method, Matrix-chain multiplication, All pairs shortest path, Optimal binary search trees, 0/1 Knapsack problem, Traveling salesperson problem, Flow shop scheduling.

UNIT IV – GREEDY METHOD, BACKTRACKING   (10 periods)

Greedy Method: General method, Knapsack problem, Job sequencing with deadlines, Huffman codes, Single source shortest paths, Optimal merge patterns.

Backtracking: General method, 8–Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles.

UNIT V - BRANCH AND BOUND, NP-HARD AND NP-COMPLETE PROBLEMS

(8 periods)

Branch and Bound: LC search, LC branch and bound, FIFO branch and bound, 0/1 knapsack problem, Traveling salesperson problem.

NP Hard And NP-Complete Problems: Nondeterministic algorithms, NP-hard and NP-complete classes, Cook's theorem, NP-hard scheduling problems – Scheduling identical processors.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, 2ndEdition, Universities Press, 2008.

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithms*,3rdEdition, MIT Press, 2009.

REFERENCE BOOKS:

1. Michael T. Goodrich and RobertoTamassia*, Algorithm Design and Applications,* Wiley, 2014.

2. Alfred V.Aho, John E. Hopcroft and Jeffrey D. Ullman, *The Design and Analysis of Computer Algorithms*, Pearson, 2006.

ADDITIONAL LEARNING RESOURCES:

- https://nptel.ac.in/courses/106/106/106106131/

II B. Tech. – II Semester
(19BT31202) SOFTWARE ENGINEERING
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

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

CO1: Understand fundamental concepts of software engineering and analyze process models required to develop a software system.

CO2: Analyze software requirements and model requirements for the given scenario.

CO3: Apply design concepts and metrics for software development.

CO4: Apply testing strategies and techniques for quality software.

CO5: Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

DETAILED SYLLABUS:

UNIT I: SOFTWARE ENGINEERING AND SOFTWARE PROCESS   (11 periods)

A Generic view of process: The Nature of Software, Software Engineering- Software Engineering Layers; The Software Process, Software Engineering Practice, Software myths.

Process models: A Generic Process Model, Prescriptive Process Models-The Waterfall Model, Incremental Process Models, Specialized Process Models; The Unified Process, Agile Development-Agility, Agile Process, Extreme Programming (XP), Scrum, Dynamic System Development Method, Agile Modeling (AM), Agile Unified Process (AUP).

UNIT II: REQUIREMENTS ENGINEERING AND MODELING   (07 periods)

Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specifications, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

Requirements Modeling: Requirements Analysis, Data Modeling Concepts, Flow-Oriented Modeling, Scenario based Modeling, UML Models that supplement the Use Case, Case study on Requirements modeling for Web and MobileApps.

UNIT III: DESIGN ENGINEERING AND METRICS   (09 periods)

Design using UML: Design concepts, Software Architecture, Architectural Styles, Class Diagram - Terms and concepts, Use case Diagram - Terms and concepts, Activity Diagrams - Terms and concepts, Interaction diagrams - Terms and concepts, State machine Diagram- Terms and concepts, Component Diagram- Terms and concepts, Deployment Diagram- Terms and concepts.

Process and Project Metrics: Metrics in the process and project domains, Software Measurement, Metrics for software quality.

UNIT IV: SOFTWARE TESTING STRATEGIES AND APPLICATIONS   (08 periods)

Testing strategies: A strategic approach to software testing, Strategic issues, Test strategies for conventional software, Test strategies for object oriented software, Validation testing, System testing, The art of debugging.

Testing Conventional Applications: Software testing fundamentals, White box testing- Basis path testing, Control structure testing; Black box testing, Object oriented testing methods.

UNIT V: RISK, QUALITY MANAGEMENT AND REENGINEERING   (10 periods)

Risk and Quality Management: Reactive and Proactive risk strategies, Software risks, Risk Mitigation Monitoring and Management (RMMM), RMMM plan, Formal Technical Reviews (FTR), Software Quality Assurance (SQA)-Tasks, Goals and Metrics; Software reliability.

Reengineering: Introduction, Business Process Reengineering (BPR), Software Reengineering, Restructuring, Reverse engineering, Forward engineering.

Total Periods: 45

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

TEXT BOOKS:

1. Roger S. Pressman, *Software Engineering - A Practitioner's Approach,* McGraw-Hill International Edition, Eigth Edition, 2015.
2. Ian Sommerville, *Software Engineering*, Pearson Education, Ninth Edition, 2011.

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, "The Unified Modeling Language User Guide," Second Edition, Pearson Education, 2009.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers, Third Edition, 2007.
3. Shely Cashman Rosenblatt, *Systems Analysis and Design*, Thomson Publications, Sixth Edition, 2006.

ADDITIONAL LEARNING RESOURCES:

- https://nptel.ac.in/courses/106105087/
- https://nptel.ac.in/courses/106105182/

II B. Tech. – II Semester

(19BT41501) THEORY OF COMPUTATION
(Common to CSSE and IT)

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

PRE-REQUISITES: A course on "Discrete Mathematical Structures".

COURSE DESCRIPTION: Finite automata; Nondeterministic Finite automata; Regular expressions; Applications of the pumping lemma; Context-Free Grammars; Normal forms for context-free grammars; pushdown automata; Chomsky hierarchy of languages; Turing machines.

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

CO1: Design finite state machines to recognize formal languages.

CO2: Analyze formal languages using automata.

CO3: Identify different types of grammars in formal languages.

CO4: Construct context free grammars for context free languages

CO5: Develop Turing machine for different computational problems.

CO6*:* Validate formal languages of automata by applying closure properties.

DETAILED SYLLABUS:

UNIT I– FINITE AUTOMATA (10 periods)

Introduction to Finite automata, the central concepts of automata theory, Deterministic finite automata, Nondeterministic Finite automata, the equivalence of DFA and NDFA, Finite automata with epsilon-transitions, Conversion of epsilon-NFA to NFA and DFA, Mealy and Moore models.

UNIT II– REGULAR EXPRESSIONS AND LANGUAGES (9 periods)

Regular expressions, Identity rules, Finite automata and Regular expressions, Applications of regular expressions, Pumping lemma for regular languages, Applications of the pumping lemma, Closure properties of regular languages, Equivalence of two regular expressions, Equivalence of two finite automata and minimization of automata.

UNIT III –CONTEXT-FREE GRAMMARS (9 periods)

Context-Free Grammars, Parse trees, Applications of context free grammars, Ambiguity in grammars and languages, Normal forms for context-free grammars, the pumping lemma for context-free languages.

UNIT IV – PUSH DOWN AUTOMATA (8 periods)

Definition of the pushdown automaton, the languages of a PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata, Chomsky hierarchy of languages, the model of linear bounded automaton, Recursive and recursively enumerable languages (REL), properties of recursive and recursively enumerable languages.

UNIT V –TURING MACHINE   **(9 periods)**

Turing machine model, Representation of Turing machine, Language acceptability by Turing machine, Design of Turing machine, Techniques for Turing machine construction, Variants of Turing machines, Universal Turing machine, Undecidability.

Total Periods: *45*

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

T1. K.L.P. Mishra and N.Chandrasekaran, Theory of Computer Science: Automata Languages and Computation, PHI Learning, 3rd Edition, 2009.

REFERENCE BOOKS:

R1. John E. Hopcroft, Rajeev Motwani and Jeffrey D Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education, 3rd Edition, 2011.

R2. John C Martin, Introduction to Languages and the Theory of Computation, TMH, 4th Edition, 2010.

ADDITIONAL LEARNING RESOURCES:

https://nptel.ac.in/courses/106/104/106104148/

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

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

PRE-REQUISITES: --

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCES BOOKS:

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

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

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

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

PRE-REQUISITES: --

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting*, Kalyani Publishers, Ludhiana, 10th edition, 2016.

2. I.M. Pandey, *Financial Management*, Vikas Publishing House Pvt. Ltd., 14th edition, 2016.

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.

2. CA SaravanaPrasath, *Cost Accounting and Financial management*, Wolters Kluwer India Pvt. Ltd., New Delhi, 2018 edition, 2018.

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

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

PRE-REQUISITES: --

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

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

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

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

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

DETAILED SYLLABUS:

UNIT I–GENDER ANDENVIRONMENT RELATIONSHIP   **(9 periods)**

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

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

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

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

UNIT III–GENDER ANDSUSTAINABLE DEVELOPMENT   **(9 periods)**

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

UNIT IV–GENDER IN ENVIRONMENTAL JUSTICE   **(9 periods)**

Normative Concerns (Fairness, Inequality & Justice) - Making sense of Environmental justice – Ecological debt, Transnational harm, & human rights – Ecological justice – Gender & Environmental Justice – Gender, Vulnerability & risk – Women in environmental justice movements – Knowledge & participation – Gender, sustainability & justice as guiding concepts.

UNIT V – GENDER AND ENVIRONMENTAL SECURITY **(9 periods)**

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCE BOOKS:

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

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

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

II B. Tech. – II Semester
(19BT4HS07) **INDIAN ECONOMY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

DETAILED SYLLABUS:

UNIT I–INTRODUCTION **(9 periods)**

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

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

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

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

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

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

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCE BOOKS:

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

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

II B. Tech. – II Semester

(19BT4HS09) LIFE SKILLS

(Open Elective-2)

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

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

PRE-REQUISITES: --

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

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

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

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

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

DETAILED SYLLABUS:

UNIT I–POSITIVE ATTITUDE   **(9 periods)**

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

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

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

UNIT III–CROSS-CULTURAL COMMUNICATION   **(9 periods)**

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

UNIT IV–CORE THINKING, PROBLEM SOLVING AND DECISION MAKING

          (9 periods)

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Dr. K. Alex (2018) *Soft Skills*, S. Chand and Company Limited, New Delhi.

2. Manmohan Joshi (2017) *Soft Skills*, bookboon.com, Bangalore.

REFERENCE BOOKS:

1. Meenakshi Raman and Prakash Singh (2013), *Business Communication*, Oxford University Press, New Delhi.

2. Jeff Butterfield (2011) *Soft Skills for Everyone*, Cengage Learning India Private Limited, Delhi.

II B. Tech. – II Semester
(19BT4HS11) PROFESSIONAL ETHICS
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

DETAILED SYLLABUS:
UNIT I–ENGINEERING ETHICS   (9 periods)

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

UNITII–PROFESSIONAL IDEALS AND VIRTUES   (8 periods)

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

UNIT III–ENGINEERING AS SOCIAL EXPERIMENTATION   (10 periods)

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

UNIT IV–RESPONSIBILITIES AND RIGHTS   (9 periods)

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

UNITV–GLOBAL ISSUES   (9 periods)

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

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, *Ethics in Engineering*, Tata McGraw-Hill, 3rd edition, 2007.

2. Govindarajan, M., Nata Govindarajan, M., Natarajan, S. and Senthilkumar, V. S., *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. S. Kannan and K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.

2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, Oxford University Press, 2001.

II B. Tech. – II Semester
(19BT4HS13) **INDIAN TRADITION AND CULTURE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK(S):

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

REFERENCE BOOKS:

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

II B. Tech. - II Semester
(19BT40106) DISASTER MITIGATION AND MANAGEMENT
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

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

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

DETAILED SYLLABUS:
UNIT I–DISASTERS   (9 periods)
Types of disasters - Natural disasters; Impact of disasters on environment, infrastructure and development; Concepts of hazards and vulnerability analysis, Hazard Assessment, Guidelines for hazard assessment and vulnerability analysis, Basic principles and elements of disaster mitigation.

UNIT II–EARTHQUAKES   (9 periods)
Introduction to earthquake, Intensity scale (MSK–64), Seismic zones and activity in India, Action plan for earthquake disaster preparedness, Elements at risk, Recovery and rehabilitation after earthquake, Concepts of Earthquake resistant design and construction of buildings; Tsunami – Onset, Types and causes,Warning, Elements at risk, Typical effects, Specific preparedness and mitigation strategies, Case studies.

UNIT III–FLOODS, CYCLONES AND DROUGHTS   (11periods)
Floods and Cyclones: Onset, Types, Causes, Warnings, Elements at risk, Typical effects, Indian floods and cyclones, Hazard zones, Potential for reducing hazards, Mitigation strategies and community based mitigation, Case studies.

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

UNIT IV–LANDSLIDES   (8periods)

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

UNIT V–DISASTER MANAGEMENT   (8periods)

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ADDITIONAL LEARNING RESOURCES:

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

II B. Tech. - II Semester
(19BT40107) **SUSTAINABLE ENGINEERING**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

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

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

DETAILED SYLLABUS:

UNIT I–PRINCIPLES OF SUSTAINABILITY   (9 periods)

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

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

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

UNIT III–SUSTAINABLE ENGINEERING PRACTICES   (9 periods)

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

UNIT IV–SUSTAINABLE ENGINEERING APPLICATIONS   (9 periods)

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

UNIT V–SUSTAINABLE URBANIZATION AND INDUSTRIALIZATION   (9 periods)

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCE BOOKS:

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

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

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

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

ADDITIONAL LEARNING RESOURCES:

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

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

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

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

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

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

PRE-REQUISITES: --

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

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

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

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

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

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

CO5. Analyze labour regulations to address labour safety issues.

DETAILED SYLLABUS:

UNIT I–CONSTRUCTION CONTRACTS (9periods)

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

UNIT II–TENDERS (9periods)

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

UNITIII–ARBITRATION (9periods)

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

UNIT IV–LEGAL REQUIREMENTS (9 periods)

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

UNIT V – LABOUR REGULATIONS   (9periods)

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCES BOOKS:

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

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

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

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

ADDITIONAL LEARNING RESOURCES:

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

II B. Tech. - II Semester
(19BT40306) GLOBAL STRATEGY AND TECHNOLOGY
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PREREQUISITES: --

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

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

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

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

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

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

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

DETAILED SYLLABUS:

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

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

UNIT II–GLOBALIZATION **(9 periods)**

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

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

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

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

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

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

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

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

                                                     Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

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

PRE-REQUISITES: --

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

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

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

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

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

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

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

DETAILED SYLLABUS:
UNIT I–MANAGERIAL FUNCTION AND PROCESS   (10 periods)

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

UNITII–HUMAN RESOURCE MANAGEMENT   (8 periods)

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

UNITIII–OPERATIONS MANAGEMENT   (10 periods)

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

UNIT IV–MARKETING MANAGEMENT   (8 periods)

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

UNIT V–PROJECT MANAGEMENT   (9 periods)

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. MartandT.Telsang, *Industrial Engineering and Production Management*, S. Chand, 2nd Edition, 2006.

2. Koontz and Weihrich, *Essentials of Management*,TMH, 6th Edition, New Delhi, 2007.

REFERENCE BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons,2010.

2. N.D. Vohra, *Quantitative Techniques in Management*, TMH, 2nd Edition, New Delhi.

3. L.M. Prasad, *Principles and practice of Management*, S. Chand and Sons, 2006.

II B. Tech. - II Semester
(19BT40504) CYBER LAWS AND SECURITY
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

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

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

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

UNIT IV–INTELLECTUAL PROPERTY RIGHTS AND THE INTERNET WORLD

(9 periods)

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

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK(S):

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

REFERENCE BOOKS:

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

ADDITIONAL LEARNING RESOURCES:

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

II B. Tech. – II Semester
(19BT50208) INTELLECTUAL PROPERTY RIGHTS
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

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

DETAILED SYLLABUS:

UNITI–INTRODUCTION TO INTELLECTUAL PROPERTY   (10 periods)

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

UNIT II–TRADEMARKS   (8 Periods)

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

UNIT III–LAW OF COPYRIGHTS   (9 Periods)

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

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

UNIT IV–TRADESECRETS   (9 periods)

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

Unfair competition: Misappropriation right of publicity, false advertising.

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

REFERENCE BOOKS:

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

ADDITIONAL LEARNING RESOURCES:

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

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

II B. Tech. - II Semester
(19BT50409) GREEN TECHNOLOGIES
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: --

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

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

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

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

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

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

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

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

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

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

UNIT II–GREEN ENERGY **(9 periods)**

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

UNIT III–GREEN IT **(9 periods)**

Introduction, Awareness to Implementation: Green IT Trends, Green Engineering, Greening by IT: Using RFID for Environmental Sustainability, Smart Grids, Smart Buildings and

Homes, Green Supply Chain and Logistics, Enterprise-Wide Environmental Sustainability, A Seven-Step Approach to Creating Green IT Strategy: Balancing the Costs and Benefits of Going Green, Research and Development Directions.

UNIT IV–GREEN CONSTRUCTION   (9 periods)

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

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

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

UNIT V – GREEN MANUFACTURING   (9 periods)

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

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

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

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

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

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

REFERENCE BOOKS:

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

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

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

II B. Tech–II Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

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

PRE-REQUISITES: -

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

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

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

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

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

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

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

*First TEN exercises are mandatory among the following:

List of Exercises:

1. **Body Language**

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

2. **Assertiveness**

   Communications Styles – Benefits – Being Unassertive – Role Playing

3. **Goal Setting**

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

4. **Thinking Skills**

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

5. **Team Building**

   Learning Activities – Management Essentials – Team Building Scenarios

6. **Conflict Management**

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

7. **Technical Report Writing**

   Objectives – Formats – Writing Styles

8. **Résumé Writing**

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

9. **Group Discussions**

   Types of GD – Dos and Don'ts – Dynamics of GD – Intervention – Summarization Techniques

10. **Interview Skills**

    Planning – Opening Strategies – Answering Strategies – Tele Conferencing – Video Conferencing

11. **Interpersonal Skills**

    Starting a Conversation – Responding to a Conversation – Conversation Examples – Body Language – Role Play

12. **Etiquette**

    Basic Social Etiquette – Telephone Etiquette – Dinning Etiquette – Conference Etiquette

TEXT BOOKS

   1. Soft Skills Lab Manual, SVEC.

REFERENCE BOOKS:

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

SUGGESTED SOFTWARES:

   1. KVAN SOLUTIONS
   2. Learning to Speak English 8.1, The Learning Company – 4 CDs.
   3. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
   4. Language in Use 1, 2 & 3.
   5. Cambridge Advanced Learner's Dictionary - 3rd Edition.
   6. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES

   1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html
   2. http://job-search-search.com/interviewing/behavioral_interviews
   3. https://goo.gl/laEHOY (dealing with complaints)
   4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html
   5. https://goo.gl/FEMGXS

II B. Tech. - II Semester
(19BT40532) **DATABASE MANAGEMENT SYSTEMS LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES:- A Course on Database Management System

COURSE DESCRIPTION: Design of an ER Models, Hands-on experience on- DDL, DML commands, Query processing using operators, Joins, Views, Synonyms, Indexes, Single row functions, Group functions and Set functions; PL/SQL programming-Basic programs, Exception handling, Triggers, Functions, Cursors and Stored procedures.

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

CO1: Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.

CO2: Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.

CO3: Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.

CO4: Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.

CO5: Work independently and communicate effectively in oral and written forms.

LIST OF EXERCISES:

1. Design and analyze an ER Model for the following use case.

   Roadway Travels" is in business since 1977 with several buses connecting different places in India. Its main office is located in Hyderabad. The company wants to computerize itsoperations in the following areas:
   - o Reservations
   - o Ticketing
   - o Cancellations

   Reservations:

   Reservations are directly handled by booking office. Reservations can be made 60 days inadvance in either cash or credit. In case the ticket is not available, await listed ticket is issued to the customer. This ticket is confirmed against the cancellation.

   Cancellation and Modification:

   Cancellations are also directly handed at the booking office. Cancellation charges will becharged. Waitlisted tickets that do not get confirmed are fully refunded.

2. a) Implement Data Definition Language commands -Create, Alter, Drop, Truncate, and Rename.

   b) Implement Data Manipulation Language commands -Insert, Select, Update, and Delete.

   c) Implement Single Row functions -Character, Numeric and Date functions.

3. Implement various types of integrity constraints -NOT NULL constraint, DEFAULT constraint, UNIQUE constraint, PRIMARY key, FOREIGN key, CHECK constraint.

4. a) Implement group functions with different operators such as aggregate operators, group by, having and order by.

   b) Implement nested and correlated nested queries using set operators and set comparison operators.

5. a) Creation of views, synonyms, sequence, indexes and save point.

   b) Implement various types of joins -outer join and inner join.

Basic PL/SQL:

6. Construct PL/SQL block for the following.

   a) To determine whether a number is palindrome

   b) To determine whether a number is an Armstrong number

   c) To find greatest of three numbers

   d) To display Fibonacci series

Control Structures:

7. a) Write a program in PL/SQL to update the salary of a specific employee by 8% if the salary exceeds the mid-range of the salary against this job and update up to mid-range if the salary is less than the mid-range of the salary, and display a suitable message.

   b) Write a PL/SQL program to display the description against a student's grade using CASE statement.

Exception Handling:

8. a) Develop a PL/SQL program that displays the name and address of a student whose ID is given. If there is no student with the givenstudent ID in the database, the program should raisearun-time exception NO_DATA_FOUND, which should be captured in the EXCEPTION block.

   b) Construct the user-defined exceptions to get the salary of an employee and check it with the job's salary range. If the salary is below the range, raise an exception BELOW_SALARY_RANGE. If the salary is above the range, raise the exception ABOVE_SALARY_RANGE.

Functions:

9. a) Write a function that accepts two numbers A and B and performs the following operations.
   - o Addition
   - o Subtraction
   - o Multiplication
   - o Division

   b) Write a PL/SQL block that updates salary of an employee in Employee table by using incr function which takes employee number as argument andcalculates increment and returns increment based on the following criteria.
   If salary <= 3000, increment = 30% of salary
   If salary > 3000 and <= 6000, increment = 20% of salary
   else increment = 10% of salary

Procedures:

10. a) Write a procedure that accepts two numbers and displays their sum.

    b) Write procedures to demonstrate IN, IN OUT and OUT parameters.

Cursors:

11. a) Write a block in PL/SQL to create a Cursor that displays the employee name and number of jobs he or she has done in the past.

    b) Write a program in PL/SQL to create a cursor to display the name and salary of each employee in the EMPLOYEES table whose salary is less than that specified by a passed-in parameter value.

Triggers:

12. Develop a suitable student database application by considering appropriate attributes.

    Couple of attributes to be maintained is the attendance of a student in each subject for which he/she has enrolled and internal assessment Using TRIGGERS for the following

    a) Whenever the attendance is updated, check if the attendance is less than 85%; if so, notify the concerned head of the department.

    b) Whenever, the marks in an internal assessment test are entered, check if the marks are less than 40%; if so, and notify the concerned head of the department.

REFERENCE BOOKS:

1. Satish Ansani, *Oracle Database 11g: Hands-on SQL andPL/SQL*, PHI, 2010.

2. Pranab Kumar Das Gupta, P. Radha Krishna, *Database Management System Oracle SQL and PL/SQL*, PHI, 2nd Edition, 2009.

Software/Tools used:

- Oracle 11g

ADDITIONAL LEARNING RESOURCES:

- https://mrcet.com/pdf/Lab%20Manuals/CSE%20II-II%20SEM.pdf

- https://www.inspirenignite.com/jntuh/jntuh-b-tech-2016-2017-r16-detailed-syllabus-database-management-systems-lab/

- http://www.cittumkur.org/ise/DBMS%20MANUAL-2017%20ISE.pdf

II B.Tech. – II Semester
(19BT31232) SOFTWARE ENGINEERING LAB
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

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

PRE-REQUISITES: A Course on Software Engineering.

COURSE DESCRIPTION: Software Development Life Cycle activities-requirements specification, SRS preparation, Modeling case studies–Online Ticket Reservation system; Point of sales.

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

CO1: Analyze user requirements and prepare software requirements specifications.

CO2: Apply design principles of UML for software design.

CO3: Apply tools for developing UML diagrams.

CO4: Use cost estimation models for project evaluation.

CO5: Work effectively as an individual to design UML models.

CO6: Write and present a substantial technical report/document effectively.

LIST OF EXPERIMENTS:

1. Identify Functional and Non-Functional Requirements for:

   i) Online Ticket Reservation for Railways   ii) Online Auction Sales

2. a) Construct a flow graph for Insertion sort algorithm.

   b) Write a program to find Cyclomatic complexity for the above flow graph

   (**Hint**: McCabe's cyclomatic matrices V(G) of a graph G with n vertices , e edges and P connected components is V(G)=e-n+2P)

LIST OF CASE STUDIES:

Case studies given below should be Modeled using Visual Modeling tools in different views such as Use case view, logical view, component view, Deployment view.

CASE STUDY 1: ONLINE TICKET RESERVATION FOR RAILWAYS

Problem Statement: Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e.

Sleeper class, First class and the AC compartment. Design the application for the above problem description.

CASE STUDY 2: A POINT OF SALE (POS) SYSTEM

Problem Statement: A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDA's, touch – screens.

CASE STUDY 3: RECRUITMENT PROCEDURE FOR SOFTWARE INDUSTRY

Problem Statement: In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company. The technical skill and the experience of the candidates are reviewed and the short listed candidates are called for the interview. There may be different rounds for interview like the written test, technical interview, and HR interview. After the successful completion of all rounds of interview, the selected candidates' names are displayed. Meanwhile HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate.

CASE STUDY 4: ONLINE AUCTION SALES

Problem Statement: The online auction system is a design about a website where sellers collect and prepare a list of items they want to sell and place it on the website for visualizing. To accomplish this purpose the user has to access the site. Incase it's a new user he has to register. Purchaser's login and select items they want to buy and keep bidding for it. Interacting with the purchasers and sellers through messages does this. There is no need for customer to interact with the sellers because every time the purchasers bid, the details will be updated in the database. The purchaser making the highest bid for an item before the close of the auction is declared as the owner of the item. If the auctioneer or the purchaser doesn't want to bid for the product then there is fixed cutoff price mentioned for every product. He can pay that amount directly and own the product. The purchaser gets a confirmation of his purchase as an acknowledgement from the website. After the transition by going back to the main menu where he can view other items.

CASE STUDY 5: TWO FLOOR ELEVATOR SIMULATOR

Problem Statement: The elevator has the basic function that all elevator systems have, such as moving up and down, open and close doors, and of course, pick up passengers. The elevator is supposed to be used in a building having floors numbered from 1 to MaxFloor, where the first floor is the lobby. There are car call buttons in the car corresponding to each floor. For every floor except for the top floor and the lobby, there are two hall call buttons for the passengers to call for going up and down. There is only one down hall call button at the top floor and one up hall call button in the lobby. When the car stops at a floor, the doors are opened and the car lantern indicating the current direction the car is going is illuminated so that the passengers can get to know the current moving direction of the car. The car moves fast between floors, but it should be able to slow down early enough to stop at a desired floor. When an elevator has no requests, it remains at its current floor with its doors closed.

In order to certificate system safety, emergency brake will be triggered and the car will be forced to stop under any unsafe conditions.

CASE STUDY 6: HOME APPLIANCE CONTROL SYSTEM

Problem Statement: A home appliance control system (HACS) is a system which provides various services to remotely operate on home appliances, such as microwave oven, TV, and garage door etc through remote devices such as mobile phone, desktop and palm-top.A home appliance control system (HACS) is a system which is controlled by a remote system such as a mobile phone or a palm-top, and at the same time controls, monitors and coordinates home appliances such as air conditioner, microwave oven, garage doors, TV set, VCR, audio controller, indoor/outdoor lights, water sprinkler, home security system, bath tub controller, etc. In order to activate home appliances and to allow for different ways of cooking, the HACS needs mechanisms for communication between the different devices in the system, and for coordination among the various processes running on such devices. The system administrator of the HACS system has the ability to add a new appliance or delete an existing one. The system administrator has the ability to add a new remote device and configure it with HACS or delete an existing one when it is not used. Also the system administrator can create an account for a new user or delete existing account if it is no longer used.

REFERENCE BOOKS:

1. Grady Booch, James Rum Baugh and Ivar Jacobson, *The Unified Modeling Language User Guide*, Pearson Education, Second Edition, 2009.

2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons and David Fado, *UML 2 Toolkit*, WILEY-Dreamtech India Pvt. Ltd., 2003.

3. Rajesh Naik and Swapna Kishore, *Software Requirements and Estimation*, Tata McGraw Hill, New Delhi, 2001.

SOFTWARE/TOOLS USED:

- Visual Paradigm for modeling diagrams

II B. TECH. – II Semester

(19BT41531) DESIGN AND ANALYSIS OF ALGORITHMS LAB

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

PRE-REQUISITES: A course on "Design and Analysis of Algorithms"

COURSE DESCRIPTION: Divide and conquer; Quick Sort; Merge Sort; Kruskal's Algorithm; Prim's Algorithm; Dijkstra's Algorithm; Dynamic Programming; Greedy method; Back tracking method; Floyd's Algorithm

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

CO1: Analyze the performance of Merge sort and quick sort algorithms using divide and conquer technique

CO2: Develop algorithms to solve knapsack problem using greedy and dynamic programming methods

CO3: Devise solutions for finding minimum cost spanning tree by using kruskal's and prim's algorithms

CO4: Solve different shortest path problems by applying Floyd's and Dijkstra's algorithms

CO5: Implement algorithms to solve real world problems using Dynamic Programming and backtracking methods

CO6: Work independently and communicate effectively in oral and written forms.

List of Exercises/List of Experiments:

1. Sort a given set of n integer elements using Quick Sort and merge sort methods and compute its time complexities. Run the programs for varied values of n >1000 and record the time taken to sort. Plot a graph of the time taken versus n for both algorithms. The elements can be read from a file or can be generated using the random number generator. Demonstrate how the divide and conquer method works along with its time complexity analysis: worst case, average case and best case.

2. Write a program to implement knapsack problem using greedy method.

3. a) Write a program to find minimum cost spanning tree using Kruskal's Algorithm

   b) Write a program to find minimum cost spanning tree using Prim's Algorithm

4. Write a program to find shortest paths to other vertices using Dijkstra's algorithm from a given vertex in a weighted connected graph.

5. Write a program to implement 0/1 Knapsack problem using Dynamic Programming method.

6. Write a program to implement All-Pairs Shortest Paths problem using Floyd's algorithm.

7. Write a program to implement Travelling Sales Person problem using Dynamic programming method.

8. Write a program to implement backtracking algorithm for the N-queens problem.

9. Write a program to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2, 5,

6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

10. Write a program to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, Fundamentals of Computer Algorithms, Galgotia Publications Pvt. Ltd, New Delhi, 2nd Edition, 2007.

SOFTWARE/Tools used:

Software: JDK 1.8

Operating System: Windows/ Linux

ADDITIONAL LEARNING RESOURCES:

- NPTEL course on Design and Analysis of Algorithms

  URL: https://nptel.ac.in/courses/106/101/106101060/

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

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

PRE-REQUISITES: Course on Engineering Chemistry.

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

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

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

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

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

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

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

DETAILED SYLLABUS:

UNIT - I: NATURAL RESOURCES   (07 periods)

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

UNIT - II: ECOSYSTEMS AND BIODIVERSITY   (07 periods)

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

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

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

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

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

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

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

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

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik, *Perspectives in Environmental Studies*, New Age International (P) Ltd. Publications, 6th Edition, 2018.

2. Erach Barucha, *Environmental Studies,* Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Cunningham W.P. and Cunningham M.A., *Principles of Environmental Science*, Tata McGraw-Hill Publishing Company, New Delhi, 8th Edition,2016.

2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.

3. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2014

4. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1. B. S. Chauhan, *Environmental Studies*, University Science Press, 2nd Edition, 2018.

2. Botkin and Keller, *Environmental Science: Earth as a Living Planet*, John Wiley & Sons; 8th International Student Edition, 2011.