ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

COMPUTER SCIENCE AND BUSINESS SYSTEMS

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2020-2021)

&

FOR B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2021-2022)

CHOICE BASED CREDIT SYSTEM

SREEVIDYANIKETHANENGINEERINGCOLLEGE (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

SreeVidyanikethanEngineeringCollege 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 BUSINESS SYSTEMS

VISION

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.

MISSION

- 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(CSBS) will:

1. Purse higher education in reputed institution in business Management with computer Science fundamentals and also perform technical/managerial roles in own /other organizations and contribute to the economy of nation.
2. Acquire technical skills with common business principles necessary to be competent employers, employees, leaders, and enjoy successful career with professional satisfaction.
3. Exhibit high ethical attitude and professional standards by demonstrating engineering or managerial decisions with zealin professional growth while being Productive citizens through life-long learning.

PROGRAM OUTCOMES

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

PSO1 Employ modern tools and techniques in Social networks and Data Science for managing business systems.

PSO2 Apply novel principles of computer science and mobile applications to solve problems in the competitive business world.

PSO3 Use emerging technologies of Cloud computing and Business Systems to secure enterprise applications in real life environment.

SREEVIDYANIKETHANENGINEERINGCOLLEGE(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 2020–21)

and

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2021-22)

For pursuing four year undergraduate Degree Program B.Tech offered by SreeVidyanikethanEngineeringCollege 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, SreeVidyanikethanEngineeringCollege 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) Semester-end Evaluation: A report on socially relevant project shall be submitted by the team of students to the department at the end of the semester. The Viva-Voce examination shall be conducted by the concerned guide and a senior faculty member recommended by the Head of the Department and appointed by the Chief Controller of Examinations.

12.2.3 Project Work:

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

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

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

12.2.4 Mandatory Courses:

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

12.2.5 Audit Courses:

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

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

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

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

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

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

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

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

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

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

12.4. Evaluation:

Following procedure governs the evaluation.

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

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

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

12.5. 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, SreeVidyaniketan 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

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

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

SVEC-19 CURRICULUM

Course Structure for B.Tech Program
(Effective from the Academic year 2020-21 onwards)

COMPUTER SCIENCE AND BUSINESS 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 BUSINESS SYSTEMS

I B.Tech.– ISemester

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	19BT1BS03	Engineering Physics	3	-	-	3	3	40	60	100
2	19BT2BS01	Transformation Techniques and Linear Algebra	3	1	-	4	4	40	60	100
3	19BT1HS01	Communicative English	3	-	-	3	3	40	60	100
4	19BT10201	Basic Electrical and Electronics Engineering	3	-	-	3	3	40	60	100
5	19BT12901	Programming in C	2	-	-	2	2	40	60	100
6	19BT1BS31	Engineering Physics Lab	-	-	2	2	1	50	50	100
7	19BT1HS31	Communicative English Lab	-	-	2	2	1	50	50	100
8	19BT10231	Basic Electrical and Electronics Engineering Lab	-	-	2	2	1	50	50	100
9	19BT12931	Programming in C Lab	-	-	2	2	1	50	50	100
Total			**14**	**1**	**8**	**23**	**19**	**400**	**500**	**900**

I B.Tech. – IISemester

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	19BT1BS02	Biology for Engineers	2	-	-	2	2	40	60	100
2	19BT3BS01	Numerical Methods, Probability and Statistics	3	1	-	4	4	40	60	100
3	19BT10501	Programming for Problem Solving	3	1	-	4	4	40	60	100
4	19BT31201	Discrete Mathematical Structures	3	-	-	3	3	40	60	100
5	19BT31501	Data Structures and Algorithms	3	1	-	4	4	40	60	100
6	19BT22901	Fundamentals of Business Information Systems	2	-	-	2	2	40	60	100
7	19BT10531	Programming for Problem Solving Lab	-	-	2	2	1	50	50	100
8	19BT31531	Data Structures and Algorithms Lab	-	-	2	2	1	50	50	100
9	19BT22931	Fundamentals of Business Information Systems Lab	-	-	2	2	1	50	50	100
10	19BT22932	Statistical Modeling Lab	-	-	2	2	1	50	50	100
		Total	**16**	**3**	**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	19BT30502	Computer Organization	3	-	-	3	3	40	60	100
2	19BT21501	Object Oriented Programming through Java	3		-	3	3	40	60	100
3	19BT31502	Operating Systems	3	-	-	3	3	40	60	100
4	19BT41501	Theory of Computation	3	-	-	3	3	40	60	100
5	19BT32901	Business Communication and Value Science - I	2	1	-	3	3	40	60	100
6	19BT32902	Fundamentals of Economics	3	1	-	4	4	40	60	100
7	19BT21531	Object Oriented Programming through Java Lab	-	1	2	3	2	50	50	100
8	19BT31532	Operating Systems Lab	-	-	2	2	1	50	50	100
9	19BT32931	Business Communication and Value Science – I Lab	-	-	2	2	1	50	50	100
Total			**17**	**3**	**6**	**26**	**23**	**390**	**510**	**900**
10	19BT315AC	Design Thinking	2	-	-	2	-	-	-	-

II B.Tech. – IISemester

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	19BT42901	Business Information Systems Development	3	-	-	3	3	40	60	100
5	**Open Elective-2**		3	-	-	3	3	40	60	100
6	19BT40532	Database Management Systems Lab	-	-	2	2	1	50	50	100
7	19BT31232	Software Engineering Lab	-	-	2	2	1	50	50	100
8	19BT41531	Design and Analysis of Algorithms Lab	-	-	2	2	1	50	50	100
9	19BT42931	Business Information Systems Development 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. – ISemester

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	19BT40501	Computer Networks	3	-	-	3	3	40	60	100
2	19BT51202	Web Technologies	3	-	-	3	3	40	60	100
3	19BT52901	Business Information Systems Management	3	-	-	3	3	40	60	100
	Professional Elective-1									
4	19BT50503	Artificial Intelligence	3	-	-	3	3	40	60	100
	19BT71203	Big Data Technologies								
	19BT71504	Data Visualization Techniques								
	19BT52902	Enterprise Data warehousing								
	19BT52903	Web Analytics								
5	**Open Elective-1**		3	-	-	3	3	40	60	100
	Open-Elective-3 **(Inter Disciplinary Elective-1**									
6	19BT50342	Machine to Machine Communication	3	-	-	3	3	40	60	100
	19BT60313	Optimization Techniques								
	19BT50442	Principles of Communications								
	19BT51502	Computational Statistics								
7	19BT40531	Computer Networks Lab	-	-	2	2	1	50	50	100
8	19BT51232	Web Technologies Lab	-	-	2	2	1	50	50	100
9	19BT52931	Socially Relevant Project-1	-	-	-	-	1	50	50	100
		Total	**18**	**0**	**4**	**22**	**21**	**390**	**510**	**900**
10	19BT5MC01	Universal Human Values	2	-	-	2	-	40	-	40

III B. Tech. – IISemester

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	19BT71201	Data Analytics	3	-	-	3	3	40	60	100
2	19BT61503	Information Security and Privacy	3	-	-	3	3	40	60	100
3	19BT62901	Financial Accounting System	3	1	-	4	4	40	60	100
Professional Elective-2										
4	19BT62902	Business Intelligence	3	-	-	3	3	40	60	100
	19BT62903	Data Mining								
	19BT62904	Internet of Things								
	19BT62905	Mobile Commerce								
	19BT62906	Social Network Analytics								
Professional Elective-3										
5	19BT70502	Augmented Reality and Virtual Reality	3	-	-	3	3	40	60	100
	19BT70504	Blockchain Technologies								
	19BT61502	High Performance Computing								
	19BT71506	Robotics and Intelligent Systems								
	19BT62907	Enterprise Computing								
Open-Elective-4 (Inter Disciplinary Elective-2)										
6	19BT60342	Customer Relationship Management	3	-	-	3	3	40	60	100
	19BT60343	Innovation and IP Management								
	19BT60407	Image Processing								
	19BT70307	Supply Chain Management								
7	19BT71231	Data Analytics Lab	-	-	2	2	1	50	50	100
8	19BT62931	Information Security and Privacy Lab	-	-	2	2	1	50	50	100
9	19BT62932	Socially Relevant Project-2	-	-	-	-	1	50	50	100
Total			**18**	1	**4**	**23**	**22**	**390**	**510**	**900**
10	19BT503AC	Foundations of Entrepreneurship	2	-	-	2	-	40	--	40

IV B. Tech.– ISemester

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	19BT50501	Machine Learning	3	-	-	3	3	40	60	100
2	19BT61201	Cloud Computing	3	-	-	3	3	40	60	100
3	19BT72901	Services Marketing	3	-	-	3	3	40	60	100
	Professional Elective–4									
4	19BT60503	Full StackDevelopment	3	-	-	3	3	40	60	100
	19BT51205	Mobile Computing								
	19BT71202	Mobile Application Development								
	19BT71207	Game Development								
	19BT61505	User Interface Design								
	Professional Elective–5									
5	19BT72902	Digital Entrepreneurship	3	-	-	3	3	40	60	100
	19BT72903	Digital Marketing								
	19BT72904	Financial Information Systems								
	19BT72905	HR Analytics								
	19BT72906	Lean &Agile Systems								
6	19BT7MOOC	Open Elective–5 (MOOC)	-	-	-	-	3	--	100	100
7	19BT50531	Machine Learning Lab	-	-	2	2	1	50	50	100
8	19BT61231	Cloud Computing Lab	-	-	2	2	1	50	50	100
9	19BT72931	Internship	-	-	-	-	2	--	100	100
		Total	**15**	**-**	**4**	**19**	**22**	**300**	**600**	**900**
10	19BT729AC	Enterprise Architecture Management	2	-	-	2	-	–	–	–

IV B.Tech. – IISemester

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	19BT82931	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

I B. Tech. - I Semester

(19BT1BS03)**ENGINEERING PHYSICS**

(Common to EEE, ECE, EIE, 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: 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, 2ndedition, 2009.

REFERENCE BOOKS:

1. K. Thyagarajan, *Engineering Physics*, McGraw-Hill Education (India) Pvt. Ltd, 2016.
2. R.K. Gaur and S.L. Gupta, *Engineering Physics*, Dhanpat Rai Publications (P) Ltd, 2015.

I B. Tech. - I Semester

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

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. – 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 writingtechniques 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

(19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS)

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

PRE-REQUISITES: -

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

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

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

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

UNIT-IV: Semiconductor Devices (10 Periods)

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Ashfaq Hussain*, Fundamentals of Electrical Engineering,* Dhanpatrai& Co. (P) Ltd.,3rdedition, 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. – I Semester

(19BT12901) **PROGRAMMING IN C**

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

PRE-REQUISITES: -

COURSE DESCRIPTION:

Constants, Declarations, Types of Operators; Statements and Blocks; parameter passing and returning type; Initialization, Recursion, Strings; Pointers; Arrays; Structures and I/O; Files.

COURSE OUTCOMES:

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

CO1. Design solutions for simple programming problems through 'C' language.

CO2. Create 'C' Programs using selection and iterative statements.

CO3. Design user defined functions and apply storage classes for solving problems.

CO4. Apply pre-defined functions and pointers for efficient memory management.

CO5. Implement coding in 'C' using structures and unions and preprocessor directives.

DETAILED SYLLABUS:

UNIT I – INTRODUCTION, OPERATORS & EXPRESSIONS (05 periods)

The C Character set, Writing First Program of C, Identifiers and Keywords, Data types, Constants, Variables and Arrays, Declarations, Statements and Symbolic Constants, Operators and Expressions

UNIT II – DATA INPUT AND OUTPUT & CONTROL STATEMENTS (06 periods)

Data Input and Output: Single Character Input and Output, Input Data & Output data, the gets and puts Functions.

Control Statements: Branching Statements, Looping Statements, break statement, continue Statement and goto Statement.

UNIT III – FUNCTIONS, PROGRAM STRUCTURES & ARRAYS (06 periods)

Functions: A Brief Overview, defining a Function, Accessing a Function, Function Prototypes, Parsing Argument to a Function, Recursion.

Program Structure: Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multi file Programs.

Arrays: Defining an Array, Processing an Array, Processing Array to function and Multidimensional Arrays.

UNIT IV – STRINGS & POINTERS (07 periods)

Strings: Defining a String, NULL Character, Initialization of Strings, Reading and Writing a String, processing a Strings, Character Arithmetic, Searching and Sorting of Strings, Library Functions for Strings.

Pointers: Pointer Declaration, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers.

UNIT V – STRUCTURES AND UNIONS & FILE HANDLING (06 periods)

Structures and Unions: Defining a Structure, processing a Structure, User-Defined Data types (typedef), Structures and Pointers, Passing Structures to Function, Self –Referential Structures, Unions

File Handling: Files introduction, Opening and Closing a Data File, Reading and Writing a Data File, processing a Data File, Unformatted Data File, Concept of Binary Files, Accessing the File Randomly.

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXTBOOK:

1. Byron Gottfried and Jitender Kumar C "Programming with C," Third Edition, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2016.

REFERENCE BOOKS:

1. PradipDey and Manas Ghosh, "Programming in C", Second Edition, Oxford University Press, NewDelhi, 2007.
2. E. Balagurusamy, "Programming in C", Seventh Edition, Mc Graw Hill Education (India) Pvt, Ltd, New Delhi, 2014.

ADDITIONAL LEARNING RESOURCES:

1. https://www.studytonight.com/c/
2. http://www.vssut.ac.in/lecture_notses/lecture1424354156.pdf
3. https://lecturenotes.in/subject/805/c-language-c

I B. Tech. - I Semester

(19BT1BS31)**ENGINEERING PHYSICS LAB**

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS)

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 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.-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 aMinute; 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

(19BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS)

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

PRE-REQUISITES: Physics at intermediate level.

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

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

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

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

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

List of Experiments:

Minimum Ten experiments are to be conducted.

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

REFERENCES BOOKS/ LAB MANUALS:

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

ADDITIONAL LEARNING RESOURCES:

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

I B. Tech. – I Semester
(19BT12931)**PROGRAMMING IN C LAB**

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

PRE-REQUISITES: -

COURSE DESCRIPTION:

Flowcharts, expression, decision making, looping, array, function, structure, union, file handling.

COURSE OUTCOMES:

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

CO1. Develop C programs using selection and iteration control structures.

CO2. Solve problems on lists and strings by representing them using arrays and structures.

CO3. Divide complex problems into sub problems and solve them using functions and pointers.

CO4. Create persistent storage for data using files.

CO5. Work independently and communicate effectively in oral and written forms

List of Exercises:

Task-1:

1. Write a program to compute simple interest and compound interest from the given principal, time period and interest rate
2. Write a program to swap the values of two variables without using a third variable.
3. Evaluate the following algebraic expressions

   i) $(ax + b)/(ax - b)$ ii) $2.5 \log x + \text{Cos } 32^0 + | x^2 + y^2|$

   iii) $x^5 + 10\ x^4 + 8x^3 + 4\ x + 2$ iv) ae^{kt}

Task-2:

1. Write a C program that prints the given 3 integers in ascending order using if else.
2. Develop a program to find the roots of the Quadratic equation ax^2+bx+c (a! =0), where a, b and c are provided as input. The roots of a polynomial can be computed by applying the formulas:

   R1= $(-b+ \sqrt{b^2-4ac})/2a$ r2= $(-b- \sqrt{b^2-4ac})/2a$

   The expression b^2-4ac is referred to as the discriminant

   i) if the discriminant is negative, the message no real roots should be printed.

   ii) If d=0, print single root and print that root

   iii) If d=+ve , print root1=_____ root2=_____
3. The total distance traveled by vehicle in 't' seconds is given by

   Distance = $ut + \frac{1}{2} at^2$ where 'u' and 'a' are the initial velocity (m/sec) and acceleration (m/sec^2). Write a C program to find the distance traveled at regular intervals of time given the values of 'u' and 'a'. The program should provide the

flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

4. Using switch- case statement, write a C program that takes two operands and one operator from the user, performs the operation, and then prints the answer. (consider the operators +, -, /, *)

Task-3 :

1. A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
2. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

   $1+x+x^2+x^3+\ldots\ldots\ldots\ldots +x^n$

   For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

   Print x, n, the sum

   Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.
3. Write a C program to find the sum of individual digits of a positive integer.
4. Write a program to find the factorial of a given number.

Task-4:

1. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
2. Write a C Program to generate Armstrong numbers for the given range.
3. Write a C program to calculate the following Sum:

   $Sum=1-x^2/2! +x^4/4! -x^6/6! +x^8/8!-x^{10}/10!$
4. Write a C Program to generate twin primes for the given range.

Task-5:

1. Write a C program to generate Pascal's triangle.
2. Write a C program to construct a pyramid of numbers.
3. Write a C Program to generate friendly numbers up to a given range.
4. Write a C Program to generate perfect numbers up to given range.

Task-6:

1.Write C programs that use both recursive and non-recursive functions

   i) To find the factorial of a given integer.

   ii) To find the GCD (greatest common divisor) of two given integers.

2.Write a C program to find both the largest and smallest number in a list of integers.

3.Write a C program that using functions to perform the following:

   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

Task -7:

1. Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
2. Write a C program to determine if the given string is a palindrome or not
3. Write a C Program to implement all string operations.

Task-8:

1. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S does not contain T.
2. Write a C program to count the lines, words and characters in a given text.
3. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2'scomplement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
4. Write a C program to convert a Roman numeral to its decimal equivalent.

Task-9:

1. Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers

   (Note: represent complex number using a structure.)
2. Write a Program to enter records of students display in sorted order accordingto ID number.
3. Write a C Program to return a substring from a main string using pointers.
4. Write a C program to generate character count using pointers for a given sequence of characters.

Task-10:

1. Write a C program which copies one file to another.
2. Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

REFERENCE BOOKS:

1. B. W. Kernighan and D. M. Ritchi, The C Programming Language, Second Edition, PHI.
2. B. Gottfried, Programming in C, Second Edition, Schaum Outline Series.
3. Pradip Dey and Manas Ghosh, "Programming in C," Oxford University Press, 2 ndEdition,New Delhi, 2007.

SOFTWARE/Tools used:

Turbo C 4.0

ADDITIONAL LEARNING RESOURCES:

https://www.vidyarthiplus.com/vp/attachment.php?aid=10304

I B. Tech. - II Semester

(19BT1BS02) **BIOLOGY FOR ENGINEERS**

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

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

PRE-REQUISITES: --

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

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

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

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

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

DETAILED SYLLABUS:

UNIT I – Living Organisms (6 Periods)

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

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

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

UNIT III – Genetics and Molecular Biology (6 Periods)

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

UNIT IV – Recombinant DNA technology (6 Periods)

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

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

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

Total Periods: 30

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, 6^{th} 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

(19BT3BS01) NUMERICAL METHODS, PROBABILITY AND STATISTICS

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.

I B. Tech. – II Semester

(19BT10501) PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, ECE, EIE and CSBS)

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

PRE-REQUISITES: A course on Basic Mathematics

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

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

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

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

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

(10 periods)

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

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

UNIT-II: CONTROL STRUCTURES (8 periods)

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

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

UNIT-III: SEQUENCES, SETS, DICTIONARIES AND DATA STRUCTURES (9 periods)

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

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

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

Modular Programming: need for functions, function definition, function call, variable scope and lifetime, return statement, positional arguments, keyword arguments, default

arguments and variable-length arguments, recursive functions; Modules - math, NumPy, date and time.

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

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

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B. Tech. II Semester

(19BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

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

PRE-REQUISITES: ACourse 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 successfulcompletion 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/

I B. Tech. – II 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 "Programming in C"

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. DebasisSamanta, 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,Mcgraw Hill Edition
2. SatrajSahani, 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

I B. Tech. – II Semester

(19BT22901)FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS

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

PRE-REQUISITES: --

COURSE DESCRIPTION: Managerial decision making, E-business and Enterprise systems; Spreadsheets, Document production software; Databases, Business analytics; Network components, Network types; Operations information systems, Departmental applications.

COURSE OUTCOMES:

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

CO1. Analyze types of business information systems suitable for E-business and enterprise systems.

CO2. Choose hardware and software for the computer system used in a business.

CO3. Analyzing business data by applying business analytics tools such as OLAP, cube and visualization.

CO4. Identify components of communication techniques that are necessary to exchange information within and between businesses.

CO5. Evaluate transaction processing systems, process control and office automation systems for the operational management of a business.

CO6. Assess the potential for using business information systems in different parts of an organization.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO BUSINESS INFORMATION SYSTEMS (8 Periods)

Data and information, creating information, Qualities of information, Knowledge and wisdom, the business environment, Managerial decision making, Knowledge management. Introduction to systems, Different types of systems, Business information systems, Resources that support BIS, Categories of business information system, E-business systems, Enterprise systems, BIS,and strategic advantage.

UNIT-II: HARDWARE AND SOFTWARE (7 Periods)

Components of a computer system, Major categories of computers, Types of microcomputers, Selecting input devices, Selecting output devices, Selecting storage devices, Processors, Categories of software, Document production software, Graphics packages, Spreadsheets, Management applications of productivity software, Multimedia software, Software for using the Internet.

UNIT-III: DATABASES AND BUSINESS INTELLIGENCE (5 Periods)

Databases, Business intelligence, Data warehouses, Data mining, Business analytics.

UNIT-IV: NETWORKS, TELECOMMUNICATIONS AND THE INTERNET (5 Periods)

Computer networks, Network components, Network types, The Internet.

UNIT-V: ENTERPRISE AND FUNCTIONAL BUSINESS INFORMATION SYSTEMS

(5 Periods)

Enterprise systems, Operations information systems, Management information systems, Departmental applications.

Total Periods: *30*

Topics for self-study are provided in the lesson plan

TEXTBOOKS:

1. Paul Bocij, Andrew Greasley, and Simon Hickie, "Business Information Systems Technology, Development and Management for the E-Business", Fifth edition, Pearson Education Limited, 2015.

REFERENCE BOOKS:

1. R. Kelly Rainer Jr., Casey G. Cegielski, "Introduction to Information Systems Supporting and Transforming Business", Fourth Edition, John Wiley & Sons. Inc, 2012.
2. Witold Abramowicz, Heinrich C. Mayr, "Technologies for Business Information Systems", Springer, 2007.

ADDITIONAL LEARNING RESOURCES:

1. https://www.edx.org/micromasters/iux-information-systems.
2. https://www.coursera.org/learn/business-model-canvas.

I B. Tech. – II Semester

(19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB

(Common to EEE, ECE, EIE and CSBS)

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

(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 Postorder

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. DebasisSamanta, Classic Data Structures,PHI Learning private limited, Second Edition, 2017
2. Robert Lafore, Data Structures & Algorithms in Java, Second Edition, Pearson Education (2008)

SOFTWARE/Tools used:

Software: Turbo C 4.0

Operating System: Windows/ Linux

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

I B. Tech. – II Semester

(19BT22931)**FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS LAB**

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

PRE-REQUISITES:A course on"Fundamentals of Business Information Systems"

COURSE DESCRIPTION:

Technical Support documents, Worksheet, Web pages for business, Visualization and functionalities, Survey, Data Sources.

COURSE OUTCOMES:

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

CO1. Create Spread sheets and technical support documents for business scenarios.

CO2. Design Web pages using HTML for business promotions.

CO3. Identify the functionalities of data visualization tools.

CO4. Create and connect to a data source by conducting a survey and visualize it on desired parameters.

CO5. Work independently and communicate effectively in oral and written forms.

List of Exercises/List of Experiments:

1. Identify the technical support and cost issues that should be considered when evaluating supplier proposals, as a small business organization wishes to purchase a number of personal computers and has issued a tender document to a number of suppliers.
2. Create a worksheet to keep a record of employees of M/s Opportunities Company. Employee details should include Name of Employee, Designation and Basic Salary. Enter 50 records. Calculate Dearness Allowance (DA) as 37.5% of Basic Salary, House Rent Allowance (HRA) 22.5% of Basic Salary, Provident Fund (PF) as 12% of Basic Salary, Gross Salary as Basic Salary + DA+HRA. The Income Tax (IT) as 20% of Gross Salary and Net Salary is Gross Salary – (PF+IT) for each employee. Calculate also Total Salary, Average Salary, Maximum Salary and Minimum Salary paid by the company.
3. Write the HTML code to design a simple website (at least two pages) about your business with the following properties:
    i) Each page should have appropriate titles.
    ii) The headings should scroll on the page.
    iii) Insert an appropriate image as a background of the web pages.
    iv) The heading of the page should be in RED color and style "Arial". It should be underlined and right aligned.
    v) The first page should have the information in paragraphs each of which is in different color and alignment.
    vi) The second page should contain a list of the famous tourist spots in that area.
4. Present your own solution for the scenario. You are a newly installed IT manager in a company with 100 staff. You want to convince the directors of the benefits of adopting a local-area network across the whole company.

5. Devise guidelines for the company about the stages that are necessary in the creation of a web site and the management issues involved.You are consultant to a small retailer interested in setting up a transactional e-commerce site.

Data Visualization:

1. Introduction and familiarize with User Interface of Data Visualization Software.
2. Implement the function Filtering, Sorting, Grouping, Hierarchies, Types of dates – Continuous vs. Discreet, Pivot tables on a Data Visualization Software.
3. Conduct a survey in our class and collect information about their goals and interests, visualize it.
4. Consider any data source, connect to it, and visualize for different parameters.
5. Implement union and join operations on data sources.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Paul Bocij, Andrew Greasley, and Simon Hickie, "Business Information Systems Technology, Development and Management for the E-Business", Fifth edition, Pearson Education Limited, 2015.
2. M. D'Agostino, Dov M. Gabbay, Reiner Hähnle, J. Posegga, "Handbook of Tableau Methods", Springer, 1999.

SOFTWARE/Tools used:

.Spread Sheets

.Word Processor

.HTML

. Data Visualization Software(RStudio 0.99)

ADDITIONAL LEARNING RESOURCES:

1. https://www.edx.org/course/data-visualization-for-all
2. https://www.coursera.org/search?query=data%20visualization&
3. https://www.coursera.org/learn/r-data-visualization
4. https://www.datacamp.com/courses/topic:data_visualization

I B. Tech. – II Semester

(19BT22932) **STATISTICAL MODELING LAB**

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

PRE-REQUISITES: A course on" Numerical Methods, Probability and Statistics"

COURSE DESCRIPTION: SPSS, Quartile values, Normal Distribution, Binomial Distribution, Poisson Distribution, χ^2 test, T test, Linear Regression.

COURSE OUTCOMES:

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

CO1. Apply appropriate statistical techniques for the given data and interpret results using SPSS.

CO2. Solve problems involving uncertainty by applying mathematical formalisms.

CO3. Derive relationship between a scalar response and one or more explanatory variables using Linear Regression.

CO4. Analyze experimental data by applying binomial, Poisson, and normal distributions.

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

LIST OF EXPERIMENTS:

1. Introduction to R Studio, Working with data file, windows, Menus, Dialogue boxes.
2. Collect IPE marks of the students in your class
   a) Describe the overall performance of the students by calculating an 'average' score using the mean, median, and mode.
   b) calculate the twenty-fifth percentile and quartile values.

3. CoCo S. A. is concerned at the time taken to react to customer complaints and have implemented a new set of procedures for its support center staff. The customer service director plans to reduce the mean time for responding to customer complaints to 28 days and has collected the sample data given in Table given below after implementation of the new procedures to assess the time to react to complaints (days).(Use Normal Distribution)

20	33	33	29	24	30
40	33	20	39	32	37
32	50	36	31	38	29
15	33	27	29	43	33
31	35	19	39	22	21
28	22	26	42	30	17
32	34	39	39	32	38

   (a) Estimate the mean time to react to customer complaints.

   (b) Calculate the probability that the mean time to react is not greater than 28 days.

4. A quality control system selects a sample of three items from a production line. If one or more is defective, a second sample is taken (also of size three), and if one or more of these are defective then the whole production line is stopped. Given that the probability of a defective item is 0.05, what is the probability that the second sample is taken? What is the probability that the production line is stopped? (Use Binomial Distribution)
5. A garage has three cars available for daily hire. Calculate the following probabilities if the variable is a Poisson variable with a mean of 2: (a) find the probability that on a given day that exactly none, one, two, and three cars will be hired, and determine the mean number of cars hired per day; (b) the charge of hire of a car is £25 per day and the total outgoings per car, irrespective of whether or not it is hired, are £5 per day. Determine the expected daily profit from hiring these three cars. (Use Poisson Distribution)
6. The following table shows the distribution of digits in numbers chosen at random from a telephone directory:

Digits:	0	1	2	3	4	5	6	7	8	9	Total
Frequency:	1026	1107	997	966	1075	933	1107	972	964	853	10,000

Test whether the digits may be taken to occur equally frequently in the directory (use χ^2 test).

7. The heights of 10 males of a given locality are found to be 70, 67,62,68,61,68,70,64,64,66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level. assuming thatfor, 9 degrees of freedom P (t > 1-83) = 0·05. (use T test)
8. A large manufacturing firm with some 8000 employees has designed a training programme that is supposed to increase the production of employees. The personnel manager decides to examine this claim by analyzing the data results from the first group of 20 employees that attended the course. Table given below provides the data set for the % change in production (y) measured against a range of production values (x).

Employee number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Production, x	47	71	64	35	43	60	38	59	67	56	67	57	69	38	54	76	53	40	47	23
% change in production, y	4.2	8.1	6.8	4.3	5	7.5	4.7	5.9	6.9	5.7	5.7	5.4	7.5	3.8	5.9	6.3	5.7	4	5.2	2.2

Test the linear regression model reliability for the above data.

9. Baker Ltd is concerned about the influence on petrol prices on its profit margins. The owner of the company looked at weekly petrol prices (pence per gallon) for London and compiled a time series. The series starts on 14 November 2015 and goes until 4 August 2018. The data in pence per gallon are shown in Table given below.

250.1	238.6	291.5	269.1	249.7	296.2	296.1	330.9	334.2	423.8
241.6	244.3	287.9	261.5	245	302.6	293.2	331	335.7	423.5
235.8	245.6	283.7	255.9	240.2	304.4	290.7	328.9	341.1	424.7
232.2	261.6	290.5	251.7	237.6	307.1	288.6	328.5	338.5	424.8
234.3	261.7	295.8	247.4	236.2	313.5	287.3	327.8	340.1	424.2
236.8	273.7	299.3	243	236.2	315.1	287.5	327.6	342.9	421.9
238.1	279.7	302	239.9	239.6	313.1	288.9	329.4	349.8	412.7

244.2	292	305.2	239.1	246.6	313.5	293.8	334	362.6	405.1
254	306.4	307.6	238.5	268	310.4	293.2	332.4	375.3	
254.8	304.9	309.1	242.8	271.3	307.6	292.7	329.1	376.9	
257.7	303.6	305.3	248.9	273.4	307.5	292.5	328.7	385.9	
255.6	301.6	300	247.6	275.9	306.6	298.6	326	393.1	
253.1	298.9	294.4	252.2	281.4	307	304	326.1	408.3	
248.8	296.4	287.5	253.9	287.3	303.6	319.6	327.4	412.1	
242.4	292.5	2793	253.5	295.7	300.4	328.6	333.2	418.3	

The owner is not too familiar with forecasting but knows how to use trending function. Putyourself in his shoes and do the following:

(a) Chart the time series

(b) Pick the best suitable curve to fit to the data set

(c) Extrapolate the data another 20 time periods in the future

(d) Calculate the confidence interval

(e) What do you think you need to do to preserve your profit margins?

10. Skodel Ltd employs a local transport company to deliver beers to local supermarkets. To develop better work schedules, the managers want to estimate the total daily travel time for their drivers' journeys. Initially, the managers believed that the total daily travel time would be related closely to the number of miles travelled in making the daily deliveries

Journey	**Miles travelled, x**	**Travel time(hours),y**	**Journey**	**Miles travelled, x**	**Travel time(hours),y**
1	100	9.3	11	85	7.4
2	50	4.8	12	62	6.4
3	100	8.9	13	98	8.4
4	100	6.5	14	58	4.9
5	50	4.2	15	73	6.8
6	80	6.2	16	81	7.8
7	75	7.4	17	66	6.2
8	65	6.0	18	72	7.3
9	90	7.6	19	53	4.4
10	90	6.1	20	56	4.6

(a) Plot a scatter plot and comment on a possible relationship between travel time and miles travelled.

(b) Use the data analysis regression tool to undertake the following tasks:

i) State the least squares regression model equation

ii) Comment on model reliability (r and COD)

iii) Is the independent variable significant (T-test)?

iv) Check model assumptions (residual and normality checks).

REFERENCE BOOKS/LABORATORY MANUALS:

1. S.C.Guptha and V.K. Kapoor, "Fundamentals of mathematical statistics" , SULTAN CHAND & SONS Educational Publishers, 10 edition, New Delhi.
2. Glyn Davis andBrankoPecar,"Business statistics using Excel®", Oxford University Press, 2 Edition.

ADDITIONAL RESOURCES:

1. https://nptel.ac.in/courses/111/105/111105077/
2. https://www.edx.org/course/introduction-to-statistics-probability-2

SOFTWARE/Tools used:

RStudio 0.99

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

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

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

DETAILED SYLLABUS:

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

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

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

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

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

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

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

Universal Auxiliaries; Sentence making for an effective communication; Sentence Structure -WH- Questions - How to frame Questions and give answers; Question Tags; Subject and verb agreement; Spotting Errors

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

Polite, Courteous and diplomatic terms; Useful daily expressions; Courtesy, Good manners and Etiquette; Conversation Techniques; Narrating/ Reading/ Listening to stories; Telling Stories

Total Periods: 30

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/