SANTHIRAM ENGINEERING COLLEGE :: NANDYAL
(AUTONOMOUS)

Approved by A.I.C.T.E., New Delhi, Permanently Affiliated to JNT University, Ananthapuramu
Accredited by NAAC with Grade-A, Accredited by NBA (ECE & CSE)
An ISO 9001:2015 Certified Institution, 2(f) &12(B) recognition by UGC Act, 1956
NH-40, NANDYAL-518501 (Dist), A.P.

Learn - Grow - Empower

R-23

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI

B.TECH-CSE(05)

Regular Four Year UG Degree Course
(Applicable for the batches admitted from 2023-24)
&
Lateral Entry Three Year UG Degree Course
(Applicable for the batches admitted from 2024-25)

website: www.srecnandyal.edu.in

Academic Regulations (R23) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2023-24** onwards)

1. **Award of the Degree**

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

(i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).

(ii) Registers for 160 credits and secures all 160 credits.

(iii) A Student who secures highest percentage of marks in the batch of every department will be honoured with gold medal.

(iv) A Student who secures second highest percentage of marks in the batch of every department will be honoured with silver medal.

(b) Award of B.Tech. degree with Honors if he/she fulfils the following:

(i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.

(ii) Registering for Honors is optional.

(iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. **Admissions**

Admission to the B. Tech Program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either based on the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

4. **Program related terms**

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit Definition:

1 Hr. Lecture (L) per week	**1 credit**
1 Hr. Tutorial (T) per week	**1 credit**
1 Hr. Practical (P) per week	**0.5 credit**
4 weeks MOOCs course	**1 credit**

a) ***Academic Year:*** Two consecutive (one odd + one even) semesters constitute one academic year.

b) ***Choice Based Credit System (CBCS):*** The CBCS provides a choice for students to select from the prescribed courses.

5. Semester/Credits:

i) A semester comprises 90 working days and an academic year is divided into two semesters.

ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.

iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

6. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8 – 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%
3.	Engineering Sciences (ES)	23.5	14%	10 – 18%
4.	Professional Core (PC)	54.5	34 %	30 – 36%
5.	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8 – 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	---

7. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses

2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

8. Programme Pattern

i. Total duration of the of B. Tech (Regular) Programme is four academic years.

ii. Each academic year of study is divided into two semesters.

iii. Minimum number of instruction days in each semester is 90 days.

iv. There shall be mandatory student induction program for fresher's, with a three week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.

v. Health/wellness/yoga/sports and NSS /NSS /Scouts & Guides / Community service activities are made mandatory as credit courses for all the under graduate students.

vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.

vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.

viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.

ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.

x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.

xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.

xii. A pool of interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall

focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.

xiii. Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.

xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.

xv. Undergraduate degree with Honors is introduced by the Institution for the students having good academic record.

xvi. The Institution shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

xvii. The college shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

9. Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship &Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.

iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given a separate subject code for theory subject and practical subject.

a) Continuous Internal Evaluation

i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective/short answer paper, 15 marks for subjective paper and 5 marks for assignment.

ii) Objective paper shall contain maximum of 20 bits for 10 marks /Short answer paper shall contain for 05 short answer questions with 2 marks each and Subjective paper shall contain 3 either or type questions of which student has to answer one from each either-or type of questions. Each question carries 5 marks. Time duration for the midterm examination is 110 min.

Note:

- The Subjective with Short answer paper shall contain one mandatory question with 05 short answer questions with 2 marks each and 3 either or type questions (from 2 to 7) of equal weight age of 5 marks. Any fraction shall be rounded off to the next higher mark. Total marks for each midterm examination is 25 marks.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and average marks shall be considered. For Midterm-I average of 2 assignments and for Midterm-II average of 3 assignments are considered from the respective units of syllabus.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight age given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25

Marks obtained in second mid: 20

Final mid semester Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weight age to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent

Marks obtained in second mid: 25

Final mid semester Marks: (25x0.8) + (0x0.2) =20

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

i) There shall be 6 questions and all questions are compulsory.

ii) Question I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks.

iii) There shall be 2 short answer questions from each unit.

iv) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

v) The question from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical &Electronics Engineering shall have the following pattern:

i) Question paper shall be in two parts viz., Part A and Part B with equal weight age of 35 marks each.

ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.

iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

v) ***There shall be online evaluation for semester theory end examinations. The evaluation is completely online. A minimum of 50% of theory courses shall be sent for online external evaluation. Remaining courses evaluation shall be done by online internal evaluation.***

a) Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

b) **For practical courses**, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.

c) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.

d) The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and an external examiner (expert in the subject from the same department) from the other college nominated by the principal from the panel of ***Three*** members submitted by the Head of the Department.

- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

e) For the subject having design and/or drawing, such as **Engineering Drawing / Engineering Graphics,** the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class, and there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weight age of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weight age of 5 marks. There shall be no objective paper in mid semester examination. The sum of day to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing, multiple branches, etc. is mentioned along with the syllabus.

f) **There shall be no external examination for mandatory courses** with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

g) **The laboratory and mid semester** test papers shall be preserved for a minimum of 3 years in the respective institution as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

h) **Semester End Examination answer scripts** will be preserved for one academic year (For example first year papers will be preserved up to second year second semester results declaration). However, the soft copy of all the Semester End Examinations answer scripts will be preserved permanently in the institution.

10. Skill oriented Courses

i) **There shall be five skill-oriented courses offered during III to VII semesters**.

ii) Out of the five skill courses two shall be skill-oriented courses from the same domain, of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.

iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an external subject expert nominated by the principal from the panel of Three members submitted by the Head of the Departments. The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a external subject expert nominated by the principal shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.

iv) The student shall be given an option to choose either the skill courses being offered by the institution or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the

college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

v) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the institution. The Head of the Department shall forward such proposals to the principal for approval.

vi) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the principal.

11. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete TWO courses compulsorily through MOOCs approved by the institution. A student can pursue courses other than core through MOOCs and it is mandatory to complete two courses successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the Institution.

Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

12. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the Institution shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

i) The Institution shall offer credit mobility for MOOCs and give the equivalent credit weight age to the students for the credits earned through online learning courses.

ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.

iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.

iv) The concerned department shall identify the courses permitted for credit transfer.

v) The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.

vi) The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

vii) The Institution shall ensure no overlap of MOOC exams with that of the institution examination schedule. In case of delay in results, the Institution will re-issue the marks sheet for such students.

viii) Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

ix) The respective Departments shall submit the following to the examination section of the Institution:

a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.

b) Undertaking form filled by the students for credit transfer.

x) *A MOOC course online assignment, programming assignment (if any) and proctor exam marks together taken as Final Marks (i.e.,100 marks) for that subject for credit transfer.*

xi) The Institution shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the Institution from time to time.

13. Academic Bank of Credits (ABC)

The Institution has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

i. provide option of mobility for learners across the universities/institutions of their choice
ii. provide option to gain the credits through MOOCs from approved digital platforms.
iii. facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC.
iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

14. Mandatory Internships

Summer Internships : Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University/Institution shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of

successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weight age each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the Institution.

Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the principal from the panel of Three members submitted by the Head of the Departments and is evaluated for 140 marks.

The respective departments shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

15. Guidelines for offering a Minor

To promote interdisciplinary knowledge among the students, the students admitted into B. Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

i) The Minor program requires the completion of 12 credits in Minor stream chosen.
ii) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.
iii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals/tracks under Open Electives.

16. Guidelines for offering Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry) students admitted in Engineering & Technology.

ii) A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).

iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.

iv) The concerned HODs of the college shall arrange separate class work and timetable of the courses offered under Honors program.

v) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.

vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.

vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.

viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.

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

x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xi) The Honors will be mentioned in the degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering.

Enrolment into Honors:

i) Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline

ii) The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.

iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.

iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.

v) Honors is to be completed simultaneously with a Major degree program.

vi)

Registration for Honors:

i) The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.
ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.
iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
iv) There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

17. Attendance Requirements:

i) A student shall be eligible to appear for the Institution external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects.
ii) 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.
iii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
iv) A stipulated fee shall be payable towards condonation of shortage of attendance to the University/Institution.
v) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.
vi) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.
vii) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
viii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
viii) For induction programme attendance shall be maintained as per AICTE norms.

18. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16/17.

i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university/institution norms.
ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) up to in the subjects that have been studied up to III semester.
iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) in the subjects that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required

credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted, and the BoS members of concerned Departments will suggest the substitute subjects.

19. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
90 & above	Superior	10
80 - 89	A(Excellent)	9
70 - 79	B(Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade point scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\boldsymbol{SGPA} = \frac{\sum(\boldsymbol{C_i}\ \boldsymbol{x}\ \boldsymbol{G_i})}{\sum \boldsymbol{C_i}}$$

Where, C_i is the number of credits of the i^{th}subject and

G_i is the grade point scored by the student in the i^{th}course.

The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \frac{\sum(C_i \, x \, S_i)}{\sum C_i}$$

Where "S_i" is the SGPA of the i^{th} semester and

C_i is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes:

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 5.0 < 5.5

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10

20. With–holding of Results

If the candidate has any dues not paid to the Institution or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

21. Multiple Entry / Exit Option

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6 credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6 credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

iii) **Bachelor of Science (in Field of study/discipline)** i.e., **B.Sc. Engineering in(Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Universities/Institution shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

22. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish start-ups. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. The Head of the department of the respective college shall forward such proposals submitted by the students to the principal. An evaluation committee constituted by the Institution shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not.

23. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section **2** and they will follow the academic regulations into which they are readmitted.

24. Minimum Instruction Days for a Semester:

The minimum instruction days including exams for each semester shall be 90 days.

25. Medium of Instruction:

The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

26. Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

27. Amendment of Regulations:

The institution may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the institute.

28. General Instructions:

i. The academic regulations should be read as a whole for purpose of any interpretation.
ii. Malpractices rules-nature and punishments are appended.
iii. Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor / Chairman of Academic Council is final.
v. The Universities/Institution may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Universities/Institution.
vi. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Vice-Chancellor / Head of the institution is final.

******** *****

ACADEMIC REGULATIONS (R23)

FOR B. TECH. (LATERAL ENTRY SCHEME)

*(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2024-25** onwards)*

1. Award of the Degree

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

(i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).

(ii) Registers for 120 credits and secures all 120 credits.

(b) Award of B.Tech. degree with Honors if he/she fulfils the following:

(i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.

(ii) Registering for Honors is optional.

(iii) Honors are to be completed simultaneously with B.Tech. Programme.

2. Students, who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.**2**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.

ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.
And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. Course Pattern

i) The entire course of study is three academic years on semester pattern.

ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfilment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

5. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

RULES FOR
DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	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 subject 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 subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject 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 subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and handed over to the examination of the autonomous college.
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 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 subjects of the examination (including practical and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and all examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all 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 subject only.
6.	Refuses to obey the orders of the Chief Superintendent /Assistant - Superintendent /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 officer-in charge 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 / Assistant 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 subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/ Controller of Examinations / Assistant Controller of Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University 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 subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person (s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject only or in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester / year examinations, depending on the recommendation of the committee.
12.	If any malpractice is detected, which is not covered inthe above clauses 1 to 11 shall be reported to the College for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is also involved inencouraging malpractices)
3. A show cause notice shall be issued to the college.
4. Impose a suitable fine on the college.
5. Shifting the examination centre from the college to another college for a specific periodof not less than one year.

Note:-

Whenever the performance of a student is cancelled in any subject/subjects due to Malpractice, he has to register for End Examinations in that subject/subjects consequently and has to fulfil allthe norms required for the award of Degree.

****

I B.Tech I Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week				Marks		
				Lecture	Tutorial	Practical	Credits	Internal	External	Total
1	23A94101	BS&H	COMMUNICATIVE ENGLISH	2	0	0	2	30	70	100
2	23A93101	BS	CHEMISTRY	3	0	0	3	30	70	100
3	23A91101	BS&H	LINEAR ALGEBRA & CALCULUS	3	0	0	3	30	70	100
4	23A03102	ES	BASIC CIVIL AND MECHANICAL ENGINEERING	3	0	0	3	30	70	100
5	23A05101	ES	INTRODUCTION TO PROGRAMMING	3	0	0	3	30	70	100
6	23A94102	BS&H	COMMUNICATIVE ENGLISH LAB	0	0	2	1	30	70	100
7	23A93102	BS	CHEMISTRY LAB	0	0	2	1	30	70	100
8	23A03103	ES	ENGINEERING WORKSHOP	0	0	3	1.5	30	70	100
9	23A05103	ES	COMPUTER PROGRAMMING LAB	0	0	3	1.5	30	70	100
10	23A99102	BS&H	HEALTH AND WELLNESS YOGA AND SPORTS	0	0	1	0.5	0	100	100

I B.Tech I Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
2	0	0	2

(23A94101) COMMUNICATIVE ENGLISH

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. The main objective of introducing this course, communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry-ready

UNIT-I

Lesson: HUMAN VALUES: Gift of Magi (Short Story)

• **Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
• **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
• **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information, Extensive and Intensive reading.
• **Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
• **Grammar:** Parts of Speech, Basic Sentence Structures-forming questions
• **Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT-II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

• **Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
• **Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks.
• **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
• **Writing:** Structure of a paragraph - Paragraph writing (specific topics)
• **Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.
• **Vocabulary:** Homonyms, Homophones, Homographs.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III

Lesson: BIOGRAPHY: Elon Musk

• **Listening:** Listening for global comprehension and summarizing what is listened to.
• **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed
• **Reading:** Readinga text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
• **Writing:** Summarizing, Note-making, paraphrasing
• **Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations
• **Vocabulary:** Compound words, Collocations

UNIT-IV

Lesson: INSPIRATION: The Toys of Peace by Saki

• **Listening:** Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
• **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
• **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
• **Writing:** Letter Writing: Official Letters, Resumes
• **Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice
• **Vocabulary:** Words often confused, Jargons

UNIT-V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

• **Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
• **Speaking:** Formal oral presentations on topics from academic contexts
• **Reading:** Reading comprehension.
• **Writing:** Writing structured essays on specific topics, Writing review on the book reading.
• **Grammar:** Editing short texts - identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
• **Vocabulary:** Technical Jargons

TEXT BOOKS:

1. Pathfinder: Communicative English for Undergraduate Students, 1 st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014

e-Resources and Digital Material:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes
6. https://www.talkenglish.com/grammar/grammar.aspx

COURSE OUTCOMES:

1. Understand the context, topic, and pieces of specific information from social or transactional dialogues.(L1)
2. Apply grammatical structures to formulate sentences and correct word forms.(L3)
3. Analyze discourse markers to speak clearly on a specific topic in informal discussions. (L4)
4. Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. (L5)
5. Create a coherent paragraph, essay, and resume. (L6)

Remarks:

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA??

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A93101) CHEMISTRY

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To familiarize engineering chemistry and its applications
2. To train the students on the principles and applications of electrochemistry and polymers
3. To introduce instrumental methods, and applications

UNIT-I STRUCTURE AND BONDING MODELS

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2 , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order. Crystal field theory- splitting in octahedral and tetrahedral geometry. Properties of coordination compounds.

UNIT-II MODERN ENGINEERING MATERIALS

Conductors, Insulators-Basic Concept, Applications, Semiconductors - Introduction, basic concept, application Superconductors-Introduction basic concept, applications. Supercapacitors: Introduction, Basic Concept-Classification - Applications.. Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nanoparticles.

UNIT-III ELECTROCHEMISTRY AND APPLICATIONS

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries-working of the batteries including cell reactions; Fuel cells, hydrogen-oxygenfuel cell–working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-IV POLYMER CHEMISTRY

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation. Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT-V INSTRUMENTAL METHODS AND APPLICATIONS

Electromagnetic spectrum. Absorption of radiation: Beer-Lamberts law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

TEXT BOOKS:

1. . Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins- Physical Chemistry, 10/e, Oxford University Press, 2010.
3. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, Engineering Chemistry 1/e Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016
4. B.K Sharma Engineering Chemistry, Krishna Prakashan, Meerut.

REFERENCE BOOKS:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

e-Resources and Digital Material:

1. https://www.digimat.in/nptel/courses/video/122106028/L01.html
2. https://www.digimat.in/nptel/courses/video/104101115/L01.html

COURSE OUTCOMES:

1. Compare the materials of construction for battery and electrochemical sensors
2. Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers ,conducting polymers.
3. Explain the principles of spectrometry, slc in separation of solid and liquid mixtures.
4. Apply the principle of Band diagrams in the application of conductors and semiconductors.
5. Summarize the concepts of Instrumental methods.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A91101) LINEAR ALGEBRA & CALCULUS

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT-I MATRICES

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Consistency of linear system of equations, Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT-II EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III CALCULUS

Mean Value Theorems: Rolle’s Theorem, Lagrange’s mean value theorem with their geometrical interpretation, Cauchy’s mean value theorem, Taylor’s and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems. Curvature: Radius of curvature, Centre of curvature.

UNIT-IV PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor’s and Maclaurin’s series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V MULTIPLE INTEGRALS (MULTI VARIABLE CALCULUS)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition

REFERENCE BOOKS:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021)

e-Resources and Digital Material:

1. https://elibrary.in.pearson.com
2. https://archive.nptel.ac.in/courses/111/106/111106051/

COURSE OUTCOMES:

1. Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
2. Utilize mean value theorems to real life problems
3. Familiarize with functions of several variables which is useful in optimization
4. Learn important tools of calculus in higher dimensions.
5. Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A03102) BASIC CIVIL AND MECHANICAL ENGINEERING
PART A: BASIC CIVIL ENGINEERING

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. Get familiarized with the scope and importance of Civil and Mechanical Engineering in different sectors and industries.
2. Introduce the preliminary concepts of Building Planning, Building Construction, Materials and the related tests.
3. Acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.

UNIT-I BASICS OF CIVIL ENGINEERING

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering- Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials- Cement - Aggregate- Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel /Theatre.

UNIT-II SURVEYING

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements Angular Measurements- Levelling instruments used for levelling- Introduction to Bearings Simple problems on levelling and bearings-Contour mapping.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III TRANSPORTATION ENGINEERING, WATER RESOURCES AND ENVIRONMENTAL ENGINEERING

Importance of Transportation in Nations economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation-Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water Specifications and Tests- Introduction to Hydrology- Hydrograph-Ground Water - Irrigation-Rain water Harvesting Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

TEXT BOOKS:

1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata Mcgraw Hill publications (India) Pvt. Ltd.
2. Basic Civil Engineering, S.S. Bhavikatti, New Age International Publishers.
3. Engineering Materials, Dr. S.C. Rangwala, Charotor Publishing House.

REFERENCE BOOKS:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi.

e-Resources and Digital Material:

1. https://www.nptelvideos.com/course.php?id=285
2. https://nptel.ac.in/courses/105101087

COURSE OUTCOMES:

1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
2. Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
3. Realize the importance of Transportation in nations economy and the engineering measures related to highways in terms of geometrics.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A03102) BASIC CIVIL AND MECHANICAL ENGINEERING
PART B: BASIC MECHANICAL ENGINEERING

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. Explain different engineering materials and manufacturing processes.
2. Provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications

UNIT-I INTRODUCTION TO MECHANICAL ENGINEERING

Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT-II MANUFACTURING PROCESSES AND THERMAL ENGINEERING

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT-III POWER PLANTS, MECHANICAL POWER TRANSMISSION & INTRODUCTION TO ROBOTICS

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Cotters and Knuckle joints, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.
(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXT BOOKS:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, cengage learning India pvt. Ltd

REFERENCE BOOKS:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata Mcgraw Hill publications (India) Pvt. Ltd.

e-Resources and Digital Material:

1. https://www.nptelvideos.com/video.php?id=1191&c=7
2. https://nptel.ac.in/courses/112105249

COURSE OUTCOMES:

1. Understand the importance of water resources and storage structures so that the Social responsibilities of water conservation will be appreciated.
2. Understand the different manufacturing processes and explain the basics of thermal engineering and its applications.
3. Describe the working of different mechanical power transmission systems and power plants, learn basics of robotics.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05101) INTRODUCTION TO PROGRAMMING

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To introduce students to the fundamentals of computer programming.
2. To provide hands-on experience with coding and debugging.
3. To foster logical thinking and problem-solving skills using programming.
4. To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
5. To encourage collaborative learning and teamwork in coding projects.
6. To familiarize students with files

UNIT-I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program - Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT-II CONTROL STRUCTURES

Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

UNIT-III ARRAYS AND STRINGS

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT-IV POINTERS & USER DEFINED DATA TYPES

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, dynamic memory management. User-defined data types-Structures and Unions, Bit-fields, self-referential structures.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V FUNCTIONS & FILE HANDLING

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters, command line arguments, recursion. Scope and Lifetime of Variables, Basics of File Handling, random access to a file. Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXT BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988
2. Schaums Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

REFERENCE BOOKS:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition C Programming, A Problem Solving approach, Forouzan, Gilberg, Prasad CENAGE 3rd Edition
3. C Programming, A Problem solving Approach, Forouzan, Gilberg, Prasad, CENAGE, 3rd Edition
4. C How to Program, 9th Edition, Paul Deitel, Pearson edition.
5. How to solve it by computer, R.G. Dromey, Prentice hall international edition

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc20_cs06/preview

COURSE OUTCOMES:

1. Understand basics of computers, the concept of algorithm and algorithmic thinking.
2. Analyze a problem and develop an algorithm to solve it.
3. Implement various algorithms using the C programming Language
4. Understand more advanced features of C language.
5. Develop problem-solving skills and the ability to debug and optimize the code.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
0	0	2	1

(23A94102) COMMUNICATIVE ENGLISH LAB

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning students will get trained in the basic communication skills and also make them ready to face job interviews.

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films

REFERENCE BOOKS:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press.

e-Resources and Digital Material:

1. www.esl-lab.com
2. www.englishmedialab.com

3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured

COURSE OUTCOMES:

1. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.(L1)
2. Apply communication skills through various language learning activities.(L3)
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.(L4)
4. Evaluate and exhibit professionalism in participating in debates and group discussions.(L5)
5. Create effective resonate and prepare themselves to face interviews in future.(L6)

Remarks:

Additional E-Resources:

1. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
2. https://www.youtube.com/c/engvidAdam/featured
3. https://www.youtube.com/c/EnglishClass101/featured
4. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
5. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
0	0	2	1

(23A93102) CHEMISTRY LAB

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Verify the fundamental concepts with experiments.

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method.
2. Conductometric titration of strong acid vs. strong base.
3. Conductometric titration of weak acid vs. strong base.
4. Determination of cell constant and conductance of solutions.
5. Potentiometry - determination of redox potentials and emfs.
6. Determination of Strength of an acid in Pb-Acid battery .
7. Preparation of a Bakelite .
8. Verify Lambert-Beer's law .
9. Wavelength measurement of sample through UV-Visible Spectroscopy.
10. Identification of simple organic compounds by IR .
11. Preparation of nanomaterials by precipitation method .
12. Estimation of Ferrous Iron by Dichrometry.

TEXT BOOKS:

1. Skoog and West, Principles of Instrumental Analysis, Thomson, 2007.
2. J.M. Lehn, Supra Molecular Chemistry, VCH Publications

REFERENCE BOOKS:

1. Vogel s Quantitative Chemical Analysis 6th Edition 6th Edition Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

e-Resources and Digital Material:

1. https://www.labsafety.org/report-a-lab-accident
2. https://www.labsafety.org/product/lab-safety-rules

COURSE OUTCOMES:

1. Determine the cell constant and conductance of solutions.
2. Prepare advanced polymer Bakelite materials.
3. Measure the strength of an acid present in secondary batteries.
4. Analyse the IR spectra of some organic compounds.

5. Calculate strength of acid in Pb-Acid battery.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A03103) ENGINEERING WORKSHOP

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood Working and Make following joints.

a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal Working, Developments of following sheet metal job from GI sheets.

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting Exercises

a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and Change of two-Wheeler tyre.

5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the Following connections

a) Parallel and series b) Two-way switch c) Go down lighting d) Tube light
e) Three phase motor f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding.

Preparation of Lap Joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black,Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017

REFERENCE BOOKS:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition.
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22

COURSE OUTCOMES:

1. Identify workshop tools and their operational capabilities.
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
3. Apply fitting operations in various applications.
4. Apply basic electrical engineering knowledge for House Wiring Practice.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A05103) COMPUTER PROGRAMMING LAB

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.

ii) Exposure to Turbo C, gcc

iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers

ii) Conversion of Fahrenheit to Celsius and vice versa

iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using herons formulae
iv) Distance travelled by an object

UNIT II

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator- precedence and associativity

i) Evaluate the following expressions.

a) A+B*C+(D*E) + F*G
b) A/B*C-B+A*D/3
c) A+++B---A
d) J= (i++) + (++i)

ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of -if construct- namely if-else, null else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for -if construct-.

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops
Lab 6: Iterative problems e.g., the sum of series
i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT III

WEEK 7:
Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:
Tutorial 7: 1 D Arrays: searching.
Lab 7:1D Array manipulation, linear search
i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2s complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8:
Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:
Tutorial 8: 2 D arrays, sorting and Strings.
Lab 8: Matrix problems, String operations, Bubble sort
i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9:
Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array

and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:
Tutorial 9: Pointers, structures and dynamic memory allocation
Lab 9: Pointers and structures, memory dereference.
i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 10:
Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:
Tutorial 10: Bitfields, Self-Referential Structures, Linked lists
Lab10 : Bitfields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields
i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bitfields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent,
Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.
i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.
iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Eulers method

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.

ii) Write a recursive function to find the lcm of two numbers.

iii) Write a recursive function to find the factorial of a number.

iv) Write a C Program to implement Ackermann function using recursion.

v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.

ii) Demonstrate Dangling pointer problem using a C program.

iii) Write a C program to copy one string into another using pointer.

iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.

ii) Write a C program to write and read text into a binary file using fread() and fwrite()

iii) Copy the contents of one file to another file.

iv) Write a C program to merge two files into the third file using command-line arguments.

v) Find no. of lines, words and characters in a file

vi) Write a C program to print last n characters of a given file.

TEXT BOOKS:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

COURSE OUTCOMES:

1. Read, understand, and trace the execution of programs written in C language.
2. Select the right control structure for solving the problem.
3. Develop C programs which utilize memory efficiently using programming constructs like pointers.
4. Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. I Sem.

L	T	P	C
0	0	1	0.5

(23A99102) HEALTH AND WELLNESS YOGA AND SPORTS

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Environment & Sustainability**

COURSE OBJECTIVES:

1. The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

UNIT I Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups. **Activities:**

1. Organizing health awareness programmes in community
2. Preparation of health profile
3. Preparation of chart for balance diet for all age group

UNIT II Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.**Activities:**

Yoga practices - Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar **UNIT III**Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.**Activities:**

1. Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics
2. Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE OUTCOMES:

1. Understand the importance of yoga and sports for Physical fitness and sound health.
2. Demonstrate an understanding of health-related fitness components.
3. Compare and contrast various activities that help enhance their health.
4. Assess current personal fitness levels
5. Develop Positive Personality

Remarks:

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

I B.Tech II Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week				Marks		
				Lecture	Tutorial	Practical	Credits	Internal	External	Total
1	23A91202	BS&H	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS	3	0	0	3	30	70	100
2	23A04101	ES	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	0	0	3	30	70	100
3	23A03101	ES	ENGINEERING GRAPHICS	1	0	4	3	30	70	100
4	23A05204	PC	DATA STRUCTURES	3	0	0	3	30	70	100
5	23A92101	BS&H	ENGINEERING PHYSICS	3	0	0	3	30	70	100
6	23A05102	ES	IT WORKSHOP	0	0	2	1	30	70	100
7	23A92102	BS&H	ENGINEERING PHYSICS LAB	0	0	2	1	30	70	100
8	23A04102	ES	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP	0	0	3	1.5	30	70	100
9	23A05205	PC	DATA STRUCTURES LAB	0	0	3	1.5	30	70	100
10	23A99101	BS&H	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE	0	0	1	0.5	0	100	100

I B.Tech II Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A91202) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

UNIT-I DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Orthogonal Trajectory, Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT-II LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER (CONSTANT COEFFICIENTS)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Euler-Cauchy's Linear Equations. Applications to L-C-R Circuit problems and Simple Harmonic motion

UNIT-III PARTIAL DIFFERENTIAL EQUATIONS

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT-IV VECTOR DIFFERENTIATION

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions-Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities

UNIT-V VECTOR INTEGRATION

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

COURSE OUTCOMES:

1. Solve the differential equations related to various engineering fields.
2. Identify solution methods for partial differential equations that model physical processes.
3. Interpret the physical meaning of different operators such as gradient, curl and divergence
4. Estimate the work done against a field, circulation and flux using vector calculus.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A04101) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

PART A: BASIC ELECTRICAL ENGINEERING

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

UNIT-I DC & AC CIRCUITS

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT-II MACHINES AND MEASURING INSTRUMENTS

Machines:
Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments:
Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III ENERGY RESOURCES, ELECTRICITY BILL & SAFETY MEASURES

Energy Resources:
Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill:
Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures:
Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

TEXT BOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

COURSE OUTCOMES:

1. Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
2. Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations

3. : Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.
4. Analyze different electrical circuits, performance of machines and measuring instruments.
5. Evaluate different circuit configurations, Machine performance and Power systems operation.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A04101) BASIC ELECTRICAL & ELECTRONICS ENGINEERING
PART B: BASIC ELECTRONICS ENGINEERING

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

UNIT-I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode -Zener Effect- Zener Diode and its Characteristics. Bipolar Junction Transistor -CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier.

UNIT-II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT-III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates- NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits-Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

TEXT BOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

REFERENCE BOOKS:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.

2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits Conventional Flow Version, Pearson Education,2009.

COURSE OUTCOMES:

1. Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.
2. Explain the characteristics of diodes and transistors.
3. Familiarize with the number systems, codes, Boolean algebra and logic gates.
4. Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
1	0	4	3

(23A03101) ENGINEERING GRAPHICS

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. Understand the basic principles and conventions of engineering drawing, use Engineering instruments and draw engineering curves.
2. Use orthographic projections and make the students draw the projections of lines Inclined to both the
3. Draw the projections of the Solids in different positions with respect to the Reference planes.
4. Understand the importance of sectioning and concept of development of surfaces.
5. Represent and convert isometric views to orthographic views and vice versa.

UNIT-I INTRODUCTION TO ENGINEERING GRAPHICS, CURVES AND SCALES

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola, hyperbola and Rectangular Hyperbola by general, Cycloids and Involutes by general with Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and Vernier scales.

UNIT-II ORTHOGRAPHIC PROJECTIONS, PROJECTIONS OF STRAIGHT LINES AND PLANES

Orthographic Projections: Reference plane, importance of reference lines or Plane Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes and its Traces.

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III PROJECTIONS OF SOLIDS

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

UNIT-IV SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone

UNIT-V CONVERSION OF VIEWS AND COMPUTER GRAPHICS

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (Not for end examination).

TEXT BOOKS:

1. N.D. Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
2. K.L. Narayana &P. Kannaiah, Engineering Drawing, 3/e, SciTech Publishers, 2012.

REFERENCE BOOKS:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C. John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal and C.M. Agarwal, Engineering Drawing, Tata McGraw Hill,2008.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/112/105/112105294/
2. https://nptel.ac.in/courses/112/103/112103019/

COURSE OUTCOMES:

1. Understand the principles of engineering drawing, including engineering curves, Scales, orthographic and isometric projections.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

2. Draw and interpret orthographic projections of Points, lines, Planes and solids in front, top and side views.
3. Understand and apply concepts of sectional views to represent details of solids in simple positions.
4. Gain a clear understanding of the principles behind development of surfaces and to understand how to unfold basic geometric shapes into flat patterns.
5. Develop the ability to draw isometric views and orthographic views and should be able to convert isometric views to orthographic views and vice versa.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A05204) DATA STRUCTURES

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

UNIT-I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT-II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT-III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT-IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V

Trees: Introduction to Trees, binary tree and its properties, binary tree representation. Binary Search Tree – Insertion, Deletion & Traversal.
Height Balanced Search Tree: AVL Tree and operations.

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

TEXT BOOKS:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson -Freed, Silicon Press, 2008

REFERENCE BOOKS:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcrof
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

COURSE OUTCOMES:

1. Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
2. Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
3. Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.
5. Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.
6. Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A92101) ENGINEERING PHYSICS

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

UNIT-I WAVE OPTICS

Interference: Introduction - Principle of superposition -Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films - Newtons Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) - Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicols Prism - Half wave and Quarter wave plates.

UNIT-II CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters - Bravais Lattices - crystal systems (3D) - coordination number - packing fraction of SC, BCC & FCC - Miller indices - separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - Intensity of diffracted beams, X-ray Diffractometer - crystal structure determination by Laue's and powder methods.

UNIT-III DIELECTRIC MATERIALS & MAGNETIC MATERIALS

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations - Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field – Clausius - Mossotti equation - complex dilectric constant – Frequency dependence of polarization – dielectric loss. Magnetic Materials Introduction - Magnetic dipole moment - Magnetization- Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-IV QUANTUM MECHANICS AND FREE ELECTRON THEORY

Quantum Mechanics Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. Free Electron Theory Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.

UNIT-V SEMICONDUCTORS

Semiconductors Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Determination of Energy Band Gap (Eg) Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation - Hall effect and its applications.

TEXT BOOKS:

1. A Text book of Engineering Physics - M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).

REFERENCE BOOKS:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning .
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

e-Resources and Digital Material:

1. http://ndl.iitkgp.ac.in/document/aUUzSzg0NXozaDZheVpnMEtnb3lZclAvRWllWmN0VUxxeFpzVURYaUxyWT0
2. https://books.google.com/books?id=fGo7BgUozoMC&printsec=frontcover

COURSE OUTCOMES:

1. Analyze the intensity variation of light due to polarization, interference and diffraction.
2. Familiarize with the basics of crystals and their structures.
3. Summarize various types of polarization of dielectrics and classify the magnetic materials.
4. Explain the basic concepts of Quantum Mechanics and the band theory of solids.
5. Identify the type of semiconductor using Hall effect.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	2	1

(23A05102) IT WORKSHOP

Course Category	Engineering Science (ES)
Course Enrichment Relevance	Skill Development

COURSE OBJECTIVES:

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the

instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- **Ex: Prompt**: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- **Ex: Prompt:** "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- **Ex:Prompt:** "Translate the following English sentence to French: 'Hello, how are you doing today?"

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

COURSE OUTCOMES:

1. Perform Hardware troubleshooting.
2. Understand Hardware components and inter dependencies.
3. Safeguard computer systems from viruses/worms.
4. Document/ Presentation preparation. CO5: Perform calculations using spreadsheets

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	2	1

(23A92102) ENGINEERING PHYSICS LAB

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

List of Experiments:

1. Determination of radius of curvature of a given plano convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

e-Resources and Digital Material:

1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

COURSE OUTCOMES:

1. Operate optical instruments like travelling microscope and spectrometer.
2. Estimate the wavelengths of different colors using diffraction grating.
3. Plot the intensity of the magnetic field of circular coil carrying current with distance.
4. Calculate the band gap of a given semiconductor.
5. Identify the type of semiconductor using Hall effect.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	3	1.5

(23A04102) ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

PART A: ELECTRICAL ENGINEERING LAB

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Activities: (PART A & PART B)

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
    - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
    - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
    - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc
    - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

List of experiments: (PART A)

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum Six Experiments to be performed.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

COURSE OUTCOMES:

1. Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.
2. Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.
3. Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.
4. Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
5. Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	3	1.5

(23A04102) ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

PART B: ELECTRONICS ENGINEERING LAB

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices**Note:** Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

REFERENCE BOOKS:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

COURSE OUTCOMES:

1. Identify & testing of various electronic components
2. Understand the usage of electronic measuring instruments.
3. Plot and discuss the characteristics of various electron devices.
4. Explain the operation of a digital circuit.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	3	1.5

(23A05205) DATA STRUCTURES LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

List of Experiments:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.
i) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i) Implement a stack using arrays and linked lists.

ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing

i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

TEXT BOOKS:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

REFERENCE BOOKS:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.

COURSE OUTCOMES:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

1. Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
2. Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
3. Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.
5. Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

I B.Tech. II Sem.

L	T	P	C
0	0	1	0.5

(23A99101) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

Course Category	**Basic Science & Humanities (BS & H)**
Course Enrichment Relevance	**Environment & Sustainability**

COURSE OBJECTIVES:

1. The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

UNIT I : Orientation General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance. **Activities:**

1. Conducting- ice breaking sessions-expectations from the course-knowing personal talents and skills
2. Conducting orientations programs for the students - future plans-activities-releasing road map etc.
3. Displaying success stories-motivational biopics- award winning movies on societal issues etc.
4. Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II: Nature & CareActivities:

1. Best out of waste competition.
2. Poster and signs making competition to spread environmental awareness.
3. Recycling and environmental pollution article writing competition.
4. Organising Zero-waste day.
5. Digital Environmental awareness activity via various social media platforms.
6. Virtual demonstration of different eco-friendly approaches for sustainable living.
7. Write a summary on any book related to environmental issues.

UNIT III : Community Service Activities:

1. Conducting One Day Special Camp in a village contacting village-area leaders-Survey in the village, identification of problems- helping them to solve via media-authorities-experts-etc.
2. Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS.
3. Conducting consumer Awareness. Explaining various legal provisions etc.
4. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
5. Any other programmes in collaboration with local charities, NGOs etc.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

COURSE OUTCOMES:

1. Understand the importance of discipline, character and service motto.
2. Solve some societal issues by applying acquired knowledge, facts, and techniques.
3. Explore human relationships by analyzing social problems.
4. Determine to extend their help for the fellow beings and downtrodden people.
5. Develop leadership skills and civic responsibilities.

Remarks:

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

II B.Tech I Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Structure

II B.Tech I Semester						
S.No	Subject Code	Name of the Subject	Hours/Week			Credits
			Lecture	Tutorial	Practical	
1.	23A91305	Discrete Mathematics & Graph Theory	3	0	0	3
2.	23A99303	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
3.	23A04310	Digital Logic & Computer Organization	3	0	0	3
4.	23A05307	Advanced Data Structures & Algorithms Analysis	3	0	0	3
5.	23A05308	Object Oriented Programming Through Java	3	0	0	3
6.	23A05309	Advanced Data Structures and Algorithms Analysis Lab	0	0	3	1.5
7.	23A05310	Object Oriented Programming Through Java Lab	0	0	3	1.5
8.	23A05306	Python Programming	0	1	2	2
9.	23A93303	Environmental Science	2	0	0	0
10.	23A91304	Competitive Ability Course - I	2	0	0	0
11.	23A99304a	Foreign Language Proficiency Certificate Course in French	2	0	0	0
12.	23A99304b	Foreign Language Proficiency Certificate Course in Spanish	2	0	0	0
					Total Credits:	**20**

II B.Tech I Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A91305) DISCRETE MATHEMATICS & GRAPH THEORY

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I MATHEMATICAL LOGIC

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus

UNIT-II SET THEORY

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism

UNIT-III ELEMENTARY COMBINATORICS

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems

UNIT-IV RECURRENCE RELATIONS

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations

UNIT-V GRAPHS

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs

TEXT BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

REFERENCE BOOKS:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.

e-Resources and Digital Material:

1. http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

COURSE OUTCOMES:

1. Apply mathematical logic to solve problems
2. Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature.
3. Apply basic counting techniques to solve combinatorial problems.
4. Formulate problems and solve recurrence relations.
5. Apply Graph Theory in solving computer science problems

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
2	1	0	3

(23A99303) UNIVERSAL HUMAN VALUES - UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Category	**Humanities & Social Sciences (HS)**
Course Enrichment Relevance	**Human Values**

COURSE OBJECTIVES:

1. To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

UNIT-I INTRODUCTION TO VALUE EDUCATION (6 LECTURES AND 3 TUTORIALS FOR PRACTICE SESSION)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself
Lecture 3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity - the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity - Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 Exploring Natural Acceptance
Practice Sessions for UNIT I - Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness
PS3 Exploring Natural Acceptance

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-II HARMONY IN THE HUMAN BEING (6 LECTURES AND 3 TUTORIALS FOR PRACTICE SESSION)

Lecture 7:Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT-III HARMONY IN THE FAMILY AND SOCIETY (6 LECTURES AND 3 TUTORIALS FOR PRACTICE SESSION)

Lecture 13: Harmony in the Family - the Basic Unit of Human Interaction
Lecture 14: 'Trust' - the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' - as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT-IV HARMONY IN THE NATURE/EXISTENCE (4 LECTURES AND 2 TUTORIALS FOR PRACTICE SESSION)

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V IMPLICATIONS OF THE HOLISTIC UNDERSTANDING - A LOOK AT PROFESSIONAL ETHICS (6 LECTURES AND 3 TUTORIALS FOR PRACTICE SESSION)

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order
Practice Sessions for UNIT V - Implications of the Holistic Understanding - a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

TEXT BOOKS:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. . Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa

e-Resources and Digital Material:

1. https://fdp-si.aicte-india.org/UHV%20II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201- Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202- Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV%20II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203- Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3- S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV%20II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP%20SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3- S2A%20Und%20Nature-Existence.pdf

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE OUTCOMES:

1. Define the terms like Natural Acceptance, Happiness and Prosperity(L1,L2)
2. Identify one' self, and one's surroundings (family, society nature) (L1,L2)
3. Apply what they have learnt to their own self in different day-to-day settings in real life(L3)
4. Relate human values with human relationship and human society(L4)
5. Justify the need for universal human values, harmonious existence and develop as socially and ecologically responsible engineers (L5,L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A04310) DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The main objective of the course is to . provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
2. Describe memory hierarchy concepts
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

UNIT-I DATA REPRESENTATION

Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes.

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers.

UNIT-II DIGITAL LOGIC CIRCUITS-II

Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters.

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture.

UNIT-III COMPUTER ARITHMETIC

Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT-IV THE MEMORY ORGANIZATION

Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT-V INPUT /OUTPUT ORGANIZATION

Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill, 2023
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education, 2018
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson, 2022.

REFERENCE BOOKS:

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson, 2017.
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson, 2003

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/103/106103068

COURSE OUTCOMES:

1. Design Combinational Circuits with the help of logic gates(L2).
2. Design sequential Circuits and demonstrate an understanding of computer functional units. (L2,L6)
3. Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.(L3)
4. Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)
5. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05307) ADVANCED DATA STRUCTURES & ALGORITHMS ANALYSIS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. provide knowledge on advance data structures frequently used in Computer Science domain
2. Develop skills in algorithm design techniques popularly used
3. Understand the use of various data structures in the algorithm design
4. Provide knowledge on backtracking and branch and bound techniques commonly used for solving combinatorial and optimization problems.
5. Develop an understanding of NP-Hard and NP-Complete problems, with a focus on Cook's theorem and their computational complexity.

UNIT-I INTRODUCTION TO ALGORITHM ANALYSIS, AVL TREES

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

AVL Trees - Creation, Insertion, Deletion operations and Applications

B-Trees - Creation, Insertion, Deletion operations and Applications

UNIT-II HEAP TREES (PRIORITY QUEUES),DIVIDE AND CONQUER

Heap Trees (Priority Queues) - Min and Max Heaps, Operations and Applications Graphs - Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

UNIT-III GREEDY METHOD, DYNAMIC PROGRAMMING

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths.

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths – General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT-IV BACKTRACKING,BRANCH AND BOUND

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V NP HARD AND NP COMPLETE PROBLEMS,NP HARD GRAPH PROBLEMS

NP Hard and NP Complete Problems: Basic Concepts, Cook‘s theorem‘
NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP) NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

TEXT BOOKS:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran2nd Edition University Press

REFERENCE BOOKS:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures &Programs:,N.Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

e-Resources and Digital Material:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. Abdul Bari,1. Introduction to Algorithms (youtube.com)

COURSE OUTCOMES:

1. Illustrate the working of the advanced tree data structures and their applications (L2)
2. Understand the Graph data structure, traversals and apply them in various contexts. (L2)
3. Use various data structures in the design of algorithms (L3)
4. Recommend appropriate data structures based on the problem being solved (L5)
5. Analyze algorithms with respect to space and time complexities (L4)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05308) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Identify Java language components and how they work together in applications
2. Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries
3. Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4. Understand how to design applications with threads in Java
5. Understand how to use Java apisfor program development

UNIT-I OBJECT ORIENTED PROGRAMMING

Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types,Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement

UNIT-II CLASSES AND OBJECTS

Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III ARRAYS

Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT-IV PACKAGES AND JAVA LIBRARY

Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto□unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

UNIT-V STRING HANDLING IN JAVA

Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings,Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

TEXT BOOKS:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. The complete Reference Java, 11thedition, Herbert Schildt,TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347 _shared/overview

COURSE OUTCOMES:

1. Analyze problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)
2. Design and implement classes to model real-world entities, with a focus on attributes, behaviors, and relationships between objects (L4)
3. Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)
4. Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)
5. Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX. (L3) and Choose appropriate data structure of Java to solve a problem (L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A05309) ADVANCED DATA STRUCTURES AND ALGORITHMS ANALYSIS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. acquire practical skills in constructing and managing Data structures
2. apply the popular algorithm design methods in problem-solving scenarios

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

Sample Programs:

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.

2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.

3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.

4. Implement BFT and DFT for given graph, when graph is represented by a) Adjacency Matrix b) Adjacency Lists

5. Write a program for finding the bi-connected components in a given graph.

6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).

7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists

8.Implement Job sequencing with deadlines using Greedy strategy.

9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.

10. Implement N-Queens Problem Using Backtracking.

11. Use Backtracking strategy to solve 0/1 Knapsack problem.

12. Implement Travelling Sales Person problem using Branch and Bound approach.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2 ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2 ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill

e-Resources and Digital Material:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

COURSE OUTCOMES:

1. Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)
2. Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs. (L2)
3. Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)
4. Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)
5. Compare the performance of different of algorithm design strategies (L4)
6. Design algorithms to new real world problems (L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A05310) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Practice object-oriented programming in the Java programming language
2. Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
3. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
4. Construct Threads, Event Handling, implement packages, Java FX GUI

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GU

Sample Experiments:

Exercise – 1:

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation ax2 +bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2:

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort c) Write a JAVA program using StringBuffer to delete, remove character.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Exercise - 3:

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading

Exercise - 4 :

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multi level Inheritance

c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5 :

a) Write a JAVA program give example for “super” keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6 :

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program Illustrating Multiple catch clauses

- Write a JAVA program for creation of Java Built-in Exceptions

- Write a JAVA program for creation of User Defined Exception

Exercise - 7:

a) Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds, (Repeat the same by implementing Runnable)

b) Write a program illustrating is Alive and join ()

c) Write a Program illustrating Daemon Threads.

d) Write a JAVA program Producer Consumer Problem

Exercise – 8:

8. Write a JAVA program that import and use the user defined packages

9. Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)

10. Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise – 9:

a) Write a java program that connects to a database using JDBC

b)Write a java program to connect to a database using JDBC and insert values into it.

c) Write a java program to connect to a database using JDBC and delete values from it

TEXT BOOKS:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson

REFERENCE BOOKS:

1. The complete Reference Java, 11th edition, Herbert Schildt,TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/105/106105191
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

COURSE OUTCOMES:

1. Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling. (L2)
2. Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively. (L3)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

3. Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes. (L2)
4. Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges. (L3)
5. Proficiently construct graphical user interface (GUI) applications using JavaFX (L4)
6. Develop new programs for solving typical computer science problems (L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
0	1	2	2

(23A05306) PYTHON PROGRAMMING

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Introduce core programming concepts of Python programming language.
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

UNTI-I: History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if…elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.

2. Write a Program to display all prime numbers within an interval

3. Write a program to swap two numbers without using a temporary variable.

4. Demonstrate the following Operators in Python with suitable examples. i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

5. Write a program to add and multiply complex numbers

6. Write a program to print multiplication table of a given number

UNIT-II: Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line

Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.

8. Write a program to define a function using default arguments.

9. Write a program to find the length of the string without using any library functions.

10. Write a program to check if the substring is present in a given string or not.

11. Write a program to perform the given operations on a list: i. Addition ii. Insertion iii. slicing

12. Write a program to perform any 5 built-in functions by taking any list

UNIT-III: Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

14. Write a program to count the number of vowels in a string (No control flow allowed).

15. Write a program to check if a given key exists in a dictionary or not.

16. Write a program to add a new key-value pair to an existing dictionary.

17. Write a program to sum all the items in a given dictionary.

UNIT-IV: Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.

19. Python program to print each line of a file in reverse order.

20. Python program to compute the number of characters, words and lines in a file.

21. Write a program to create, display, append, insert and reverse the order of the items in the array.

22. Write a program to add, transpose and multiply two matrices.

23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V: Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
a) Apply head () function to the pandas data frame
b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

REFERENCE BOOKS:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.

2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson

e-Resources and Digital Material:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

COURSE OUTCOMES:

1. Classify data structures of Python (L4)
2. Apply Python programming concepts to solve a variety of computational problems (L3)
3. Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)
4. Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)
5. Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)
6. Propose new solutions to computational problems (L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
2	0	0	0

(23A93303) ENVIRONMENTAL SCIENCE

Course Category	**Mandatory Course (Non-credit)**
Course Enrichment Relevance	**Environment & Sustainability**

COURSE OBJECTIVES:

1. To make the students to get awareness on environment
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
3. To save earth from the inventions by the engineers.

UNIT-I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT-II ECOSYSTEMS

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III ENVIRONMENTAL POLLUTION

:

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollutio
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV SOCIAL ISSUES AND THE ENVIRONMENT

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT-V HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion ‘ Family Welfare Programmes. ‘ Environment and human health ‘ Human Rights ‘ Value Education ‘ HIV/AIDS ‘ Women and Child Welfare ‘ Role of information Technology in Environment and human health ‘ Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain ‘ Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds ‘ river, hill slopes, etc

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar,

REFERENCE BOOKS:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.

3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

COURSE OUTCOMES:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem. L T P C

(23A99304) FOREIGN LANGUAGE PROFICIENCY CERTIFICATE COURSE

Course Category	
Course Enrichment Relevance	

COURSE OBJECTIVES:

COURSE OUTCOMES:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. I Sem.

L	T	P	C
2	nil	nil	0

(23A91304) COMPETITIVE ABILITY COURSE - I

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Understand the basic concepts of quantitative ability.
2. Acquire satisfactory competency in use of Aptitude tests
3. Compete in various competitive exams like CAT, GATE, GRE, GATE, UPSC, etc.

UNIT-I NUMERICAL ABILITY

Number Systems, Number series, Decimal Fractions, Simplification, Square Roots and CubeRoots, LCM and HCF, Average, Problems on Ages.

UNIT-II NUMERICAL COMPUTATION

Surds & Indices, Logarithm, Permutation and Combinations, Probability.

UNIT-III BASIC ARITHEMATIC

Percentages, Area, Partnership, Ratio and Proportion, Mixtures and Allegation

UNIT-IV CONCISE MATHEMATICS

Profit and Loss, Simple and Compound Interest, Time, Speed and Distance.

UNIT-V DATA INTERPRETATION

Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams

TEXT BOOKS:

1. Analytical and Logical reasoning By Sijwali B S.
2. Quantitative aptitude for Competitive examination ByR S Agarwal.

REFERENCE BOOKS:

1. Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S.

e-Resources and Digital Material:

1. https://www.geeksforgeeks.org/aptitude-questions-and-answers/
2. https://www.indiabix.com/

COURSE OUTCOMES:

1. to understand the numerical systems

2. to understand the numerical calculations
3. to understand the concept of basic arithmetic
4. to understand the concept of concise mathematics
5. to analyze the data interpretations
6. to apply the concepts of aptitude in applications

Remarks:

II B.Tech II Semester
Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem. - Course Structure

S.No	Subject Code	Name of the Subject	Hours/Week			Credits
			Lecture	Tutorial	Practical	
1	23A95402	Organizational Behavior	2	0	0	2
2	23A91407	Probability & Statistics	3	0	0	3
3	23A05411	Operating Systems	3	0	0	3
4	23A05412	Database Management Systems	3	0	0	3
5	23A05413	Software Engineering	3	0	0	3
6	23A05414	Operating Systems Lab	0	0	3	1.5
7	23A05415	Database Management Systems Lab	0	0	3	1.5
8	23A05416	Full Stack Development-I	0	1	2	2
9	23A99405	Design Thinking And Innovation	1	0	2	2
10	23A91410	Competitive Ability Course - II	4	0	0	0
11	23A99406	Minor Project	0	0	3	0
					Total Credits:	**21**

II B.Tech II Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
2	0	0	2

(23A95402) ORGANIZATIONAL BEHAVIOR

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To enable student's comprehension of organizational behavior
2. To offer knowledge to students on self-motivation, leadership and management
3. To facilitate them to become powerful leaders
4. To Impart knowledge about group dynamics
5. To make them understand the importance of change and development

UNIT-I INTRODUCTION TO ORGANIZATIONAL BEHAVIOR

Meaning, definition, nature, scope and functions - Organizing Process - Making organizing effective -Understanding Individual Behaviour -Attitude -Perception - Learning -Personality.

UNIT-II MOTIVATION AND LEADING

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy - Mc Cleland's theory of needs -Mc Gregor's theory X and theory Y- Adam's equity theory.

UNIT-III ORGANIZATIONAL CULTURE

Introduction - Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory-Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

UNIT-IV GROUP DYNAMICS

Introduction - Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process - Group Development - Group norms - Group cohesiveness -Small Groups - Group decision making - Team building - Conflict in the organization - Conflict resolution

UNIT-V ORGANIZATIONAL CHANGE AND DEVELOPMENT

Introduction -Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture - Change Management - Work Stress Management - Organizationalmanagement - Managerial implications of organization's change and development

TEXT BOOKS:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition.
2. P Subba Ran, Organisational Behaviour, Himalya Publishing House.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. McShane, Organizational Behaviour, TMH
2. Nelson, Organisational Behaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson.

e-Resources and Digital Material:

1. https://www.slideshare.net/Knight1040/organizational-culture 9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714 https://www.slideshare.net/harshrastogi1/group-dynamics-159412405
2. https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951

COURSE OUTCOMES:

1. Define the Organizational Behaviour, its nature and scope. (L2)
2. Understand the nature and concept of Organizational behaviour (L2)
3. Apply theories of motivation to analyse the performance problems (L3)
4. Analyse the different theories of leadership and Develop as powerful leader (L4,L5)
5. Evaluate group dynamics (L5)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A91407) PROBABILITY & STATISTICS

Course Category	**Basic Science (BS)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To familiarize the students with the foundations of probability and statistical methods
2. To impart probability concepts and statistical methods in various applications Engineering

UNIT-I DESCRIPTIVE STATISTICS

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

UNIT-II PROBABILITY

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous),probability density functions, properties, mathematical expectation.

UNIT-III PROBABILITY DISTRIBUTIONS

Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.

UNIT-IV ESTIMATION AND TESTING OF HYPOTHESIS, LARGE SAMPLE TESTS

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT-V SMALL SAMPLE TESTS

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

TEXT BOOKS:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

REFERENCE BOOKS:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

COURSE OUTCOMES:

1. Acquire knowledge in finding the analysis of the data quantitatively or categorically and various statistical elementary tools.
2. Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.
3. Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.
4. Analyze to test various hypotheses included in theory and types of errors for large samples.
5. Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A05411) OPERATING SYSTEMS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
2. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. Illustrate different conditions for deadlock and their possible solutions.

UNIT-I OPERATING SYSTEMS OVERVIEW

Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems System **Structures:** Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT-II PROCESSES

Process Concept, Process scheduling, Operations on processes, Inter-process communication. **Threads and Concurrency**: Multithreading models, Thread libraries, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT-III SYNCHRONIZATION TOOLS

:

The Critical Section Problem, Peterson’s Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT-IV MEMORY-MANAGEMENT STRATEGIES

Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing.

Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V FILE SYSTEM

File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; **File-System Internals:** File System Mounting, Partitions and Mounting, File Sharing. Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

TEXT BOOKS:

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

REFERENCE BOOKS:

1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

COURSE OUTCOMES:

1. Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication. (L1)
2. Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. (L2)
3. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. (L3)
4. Illustrate different conditions for deadlock and their possible solutions. (L2)
5. Analyze the memory management and its allocation policies. (L4)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A05412) DATABASE MANAGEMENT SYSTEMS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
2. Introduce the concepts of basic SQL as a universal Database language
3. Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
4. Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

UNIT-I INTRODUCTION

Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT-II RELATIONAL MODEL

Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL:Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT-III SQL

Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT-IV SCHEMA REFINEMENT (NORMALIZATION)

Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependencyLossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V TRANSACTION CONCEPT

Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm. **Introduction to Indexing Techniques:** B+ Trees, operations on B+Trees, Hash Based Indexing:

TEXT BOOKS:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

1. Introduction to Database Systems, 8thedition, C J Date, Pearson.
2. Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820 2 2456_shared/overview

COURSE OUTCOMES:

1. Understand the basic concepts of database management systems (L2)
2. Analyze a given database application scenario to use ER model for conceptual design of the database (L4)
3. Utilize SQL proficiently to address diverse query challenges (L3).
4. Employ normalization methods to enhance database structure (L3)
5. Assess and implement transaction processing, concurrency control and database recovery protocols in databases. (L4)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
3	0	0	3

(23A05413) SOFTWARE ENGINEERING

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The objectives of this course are to introduce
2. Software life cycle models, Software requirements and SRS document.
3. Project Planning, quality control and ensuring good quality software.
4. Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.

UNIT-I INTRODUCTION

Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT-II SOFTWARE PROJECT MANAGEMENT

Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

UNIT-III SOFTWARE DESIGN

Overview of the design process, How to characterize a good software design Layered arrangement of modules, Cohesion and Coupling. approaches to software design.

Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)

Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-IV CODING AND TESTING

Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma.

UNIT-V COMPUTER-AIDED SOFTWARE ENGINEERING (CASE)

CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

TEXT BOOKS:

1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.
2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc Graw Hill International Edition.

REFERENCE BOOKS:

1. Software Engineering, Ian Sommerville,10th Edition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106/105/106105182/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605895063871 48827_shared/overview
3.) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003 904735_shared/overview

COURSE OUTCOMES:

1. Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance (L3)
2. Analyse various software engineering models and apply methods for design and development of software projects. (L4)
3. Develop system designs using appropriate techniques. (L3)
4. Understand various testing techniques for a software project. (L2)
5. Apply standards, CASE tools and techniques for engineering software projects (L3)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
0	0	3	1.5

(23A05414) OPERATING SYSTEMS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Provide insights into system calls, file systems, semaphores,
2. Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
3. Implement Bankers Algorithms to Avoid the Dead Lock

1. Practicing of Basic UNIX Commands.

2. Write programs using the following UNIX operating system calls

fork, exec, getpid, exit, wait, close, stat, opendir and readdir

3. Simulate UNIX commands like cp, ls, grep, etc.,

4. Simulate the following CPU scheduling algorithms

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

5. Control the number of ports opened by the operating system with

a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.

7. Write a program to solve producer-consumer problem using Semaphores.

8. Implement the following memory allocation methods for fixed partition

a) First fit b) Worst fit c) Best fit

9. Simulate the following page replacement algorithms

a) FIFO b) LRU c) LFU

10. Simulate Paging Technique of memory management.

11. Implement Bankers Algorithm for Dead Lock avoidance and prevention

12. Simulate the following file allocation strategies

a) Sequential b) Indexed c) Linked

REFERENCE BOOKS:

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016
3. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
4. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

e-Resources and Digital Material:

1. https://www.cse.iitb.ac.in/~mythili/os/
2. http://peterindia.net/OperatingSystems.html

COURSE OUTCOMES:

1. Trace different CPU Scheduling algorithms (L2).
2. Implement Bankers Algorithms to Avoid the Dead Lock (L3).
3. Evaluate Page replacement algorithms (L5).
4. Illustrate the file organization techniques (L4).
5. Illustrate Inter process Communication and concurrent execution of threads (L4)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
0	0	3	1.5

(23A05415) DATABASE MANAGEMENT SYSTEMS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraints on a database
3. Writing Queries using advanced concepts of SQL
4. Programming PL/SQL including procedures, functions, cursors and triggers.

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5.

i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISEAPPLICATION ERROR.

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

12. Create a table and perform the search operation on table using indexing and nonindexing techniques.

13. Write a Java program that connects to a database using JDBC

14. Write a Java program to connect to a database using JDBC and insert values into it

15. Write a Java program to connect to a database using JDBC and delete values from it

TEXT BOOKS:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah,
3. Rick F Vander Lans, “Introduction to SQL”, Fourth Edition, Pearson Education, 2007

REFERENCE BOOKS:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, ”Database Systems Using Oracle”, PHI, 2007
3. Rick F Vander Lans, “Introduction to SQL”, Fourth Edition, Pearson Education, 2007

e-Resources and Digital Material:

COURSE OUTCOMES:

1. Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment (L3)
2. Constructing and execute queries to manipulate and retrieve data from databases. (L3)
3. Develop application programs using PL/SQL. (L3)

4. Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality (L4)
5. Establish database connectivity through JDBC (Java Database Connectivity) (L3)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
0	1	2	2

(23A05416) FULL STACK DEVELOPMENT-I

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Make use of HTML elements and their attributes for designing static web pages
2. Build a web page by applying appropriate CSS styles to HTML elements
3. Experiment with JavaScript to develop dynamic web pages and validate forms

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events
- Node.js

Sample Experiments:

1. Lists, Links and Images

a. Write a HTML program, to explain the working of lists.
Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames

- Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

- Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).
- Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).
- Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame image, second frame paragraph, third frame hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

3. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, , tags.
b. Write a HTML program, to embed audio and video into HTML web page.
c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms

a. Write a program to apply different types of selector forms
   - Simple selector (element, id, class, group, universal)
   - Combinator selector (descendant, child, adjacent sibling, general sibling)
   - Pseudo-class selector
   - Pseudo-element selector
   - Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model

a. Write a program to demonstrate the various ways you can reference a color in CSS.
b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.
c. Write a program using the following terms related to CSS font and text:
   i. font-size ii. font-weight iii. font-style
   iv. text-decoration v. text-transformation vi. text-alignment
d. Write a program, to explain the importance of CSS Box model using
   i. Content ii. Border iii. Margin iv. padding

6. Applying JavaScript - internal and external, I/O, Type Conversion

a. Write a program to embed internal and external JavaScript in a web page.
b. Write a program to explain the different ways for displaying output.
c. Write a program to explain the different ways for taking input.
d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. JavaScript Pre-defined and User-defined Objects

a. Write a program using document object properties and methods.
b. Write a program using window object properties and methods.
c. Write a program using array object properties and methods.
d. Write a program using math object properties and methods.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

e. Write a program using string object properties and methods.
f. Write a program using regex object properties and methods.
g. Write a program using date object properties and methods.
h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. JavaScript Conditional Statements and Loops

a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
b. Write a program to display week days using switch case.
c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
d. Write aprogram to print data in object using for-in, for-each and for-of loops
e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]
f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

9. Javascript Functions and Events

a. Design a appropriate function should be called to display
   - Factorial of that number
   - Fibonacci series up to that number
   - Prime numbers up to that number
   - Is it palindrome or not

b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
   11. Factorial of that number
   12. Fibonacci series up to that number
   13. Prime numbers up to that number
   14. Is it palindrome or not

c. Write a program to validate the following fields in a registration page
   i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
   ii. Mobile (only numbers and length 10 digits)
   iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

TEXT BOOKS:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O Reilly.

e-Resources and Digital Material:

1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs

5. https://www.w3schools.com/typescript

COURSE OUTCOMES:

1. Design Websites.(L6)
2. Apply Styling to web pages.(L4)
3. Make Web pages interactive.(L6)
4. Design Forms for applications.(L6)
5. Choose Control Structure based on the logic to be implemented & Understand HTML tags, Attributes and CSS properties (L2) (L3)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
1	0	2	2

(23A99405) DESIGN THINKING AND INNOVATION

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

UNIT-I INTRODUCTION TO DESIGN THINKING

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as
fundamental design components. Principles of design. Introduction to design thinking, history
of Design Thinking, New materials in Industry.

UNIT-II DESIGN THINKING PROCESS

Design thinking process (empathize, analyze, idea & prototype), implementing the process in
driving inventions, design thinking in social innovations. Tools of design thinking - person,
costumer, journey map, brainstorming, product development
Activity: Every student presents their idea in three minutes, Every student can present design
process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT-III INNOVATION

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the
impact and value of creativity.
Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT-IV PRODUCT DESIGN

Problem formation, introduction to product design, Product strategies, Product value, Product
planning, product specifications- Innovation towards product design- Case studies
Activity: Importance of modelling, how to set specifications, Explaining their own product
design.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V DESIGN THINKING IN BUSINESS PROCESSES

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that
redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs-Design thinking for Startups- Defining and testing Business Models and Business Cases-
Developing & testing prototypes.
Activity: How to market our own product, About maintenance, Reliability and plan for startup.

TEXT BOOKS:

1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCE BOOKS:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1_noc19_mg60/preview

COURSE OUTCOMES:

1. Define the concepts related to design thinking. (L1, L2)
2. Explain the fundamentals of Design Thinking and innovation (L1, L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment (L4)
5. Evaluate the value of creativity (L5)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
4	0	0	0

(23A91410) COMPETITIVE ABILITY COURSE - II

Course Category	**Mandatory Course (Non-credit)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. This course is designed to suit the need of the students and to acquaint them with frequently asked patterns in quantitative aptitude during various examinations and campus interviews.
2. This course is designed to suit the need of the students and to acquaint them with frequently asked patterns in quantitative aptitude during various examinations and campus interviews.

UNIT-I ARITHMETIC OPERATIONS

1. Problems on Ages 2.Partnership 3.Mixture and Allegations

UNIT-II ARITHMETIC APPLICATION

1. Time and Work 2.Time speed distance 3.Boats and Streams

UNIT-III STATISTICS

1. Permutation and combination 2.probability 3.Heights and Distance

UNIT-IV MENTAL ABILITY

1. CLOCKS 2.Calenders 3.Coding Decoding

UNIT-V ANALOGICAL REASONING

1. Number Series 2.Blood Relation 3.Seating Arrangement

TEXT BOOKS:

1. Analytical and Logical reasoning By Sijwali B S.
2. Quantitative aptitude for Competitive examination By R S Agarwal.
3. Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S

REFERENCE BOOKS:

1. Quantitative aptitude for Competitive examination By R S Agarwal.

e-Resources and Digital Material:

1. https://onlinestudy4u.in/
2. careerride.com/online-aptitude-test.aspx

COURSE OUTCOMES:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

1. Understand the basic concepts of quantitative ability.
2. Acquire satisfactory competency in use of Aptitude tests
3. Compete in various competitive exams like CAT, GATE, GRE, GATE, UPSC, etc.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B.Tech. II Sem.

L	T	P	C
0	0	3	0

(23A99406) MINOR PROJECT

Course Category	**Mandatory Course (Non-credit)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1. **Web Development**
   - Basic CRUD Web Applications
   - Portfolio Website with Responsive Design
   - E-commerce Prototype (Frontend Only)
   - Blogging Website with User Authentication
2. **Mobile App Development**
   - Basic To-Do List App (Android/iOS)
   - Weather Forecasting App using API
   - Expense Tracker App
   - Quiz App with Firebase Integration
3. **Internet of Things (IoT)**
   - Smart Home Automation (Basic)
   - IoT-Based Weather Monitoring System
   - Smart Irrigation System
   - IoT-Based Health Monitoring System
4. **Artificial Intelligence & Machine Learning (Beginner Level)**
   - Spam Email Detection
   - Handwritten Digit Recognition
   - Sentiment Analysis on Twitter Data
   - Fake News Detection
5. **Cybersecurity & Ethical Hacking**
   - Password Strength Checker
   - Basic Network Packet Sniffing
   - Secure Login System Using Hashing
   - Encryption-Decryption Tool
6. **Cloud Computing & DevOps**
   - Deploying a Static Website on AWS/GCP
   - Cloud Storage-Based File Sharing System
   - Serverless Chatbot Using AWS Lambda

- Basic CI/CD Pipeline Setup

7. **Blockchain & Cryptocurrency (Basic Level)**
   - Simple Blockchain-Based Voting System
   - Digital Certificate Verification Using Blockchain
   - Smart Contract for Fund Management
8. **Data Science & Data Analytics**
   - Exploratory Data Analysis on COVID-19 Data
   - Predicting Student Performance Using Python
   - Sales Data Visualization Dashboard
   - Stock Price Analysis Using Pandas & Matplotlib
9. **Embedded Systems & Robotics**
   - Line-Following Robot
   - Bluetooth-Controlled Car
   - Automated Street Light System
   - Gesture-Controlled Device
10. **Augmented Reality (AR) & Virtual Reality (VR)**

- AR-Based Educational App
- Virtual Tour App for College Campus
- AR-Based Object Detection System

11. **Game Development**

- Simple 2D Game in Unity
- Snake Game Using Pygame
- Flappy Bird Clone

12. **Big Data & Hadoop**

- Log Analysis Using Hadoop
- Processing Large Datasets Using Spark

13. **Smart Healthcare Technologies**

- Basic AI Chatbot for Health Advice
- Smart Pill Reminder App

14. **Automation & Robotics Process Automation (RPA)**

- Automating Repetitive Tasks Using Python

15. **Renewable Energy & Green Technology**

- Solar Power Monitoring System

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE OUTCOMES:

III B.Tech I Semester Course Structure

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem. - Course Structure

S.No	Subject Code	Course Category	Name of the Subject	Hours/Week				Marks		
				Lecture	Tutorial	Practical	Credits	Internal	External	Total
1	23A33301	ES	ARTIFICIAL INTELLIGENCE	3	0	0	3	30	70	100
2	23A05519	PC	COMPUTER NETWORKS & INTERNET PROTOCOLS	3	0	0	3	30	70	100
3	23A05520	PC	AUTOMATA THEORY AND COMPILER DESIGN	3	0	0	3	30	70	100
4	23A05517	PC	INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS	3	0	0	3	30	70	100
5	23A05521	PE	PE-I:OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3	30	70	100
6	23A05522	PE	PE-I:SOFT COMPUTING	3	0	0	3	30	70	100
7	23A04519	PE	PE-I:MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3	30	70	100
8	23A05523	PE	PE-I:DATA WAREHOUSING & DATA MINING	3	0	0	3	30	70	100
9	23A01501	OE	OE-I:GREEN BUILDINGS	3	0	0	3	30	70	100
10	23A01502	OE	OE-I:CONSTRUCTION TECHNOLOGY AND MANAGEMENT	3	0	0	3	30	70	100
11	23A02503	OE	OE-I:ELECTRICAL SAFETY PRACTICES AND STANDARDS	3	0	0	3	30	70	100
12	23A03504	OE	OE-I:SUSTAINABLE ENERGY TECHNOLOGIES	3	0	0	3	30	70	100
13	23A04527	OE	OE-I:ELECTRONIC CIRCUITS	3	0	0	3	30	70	100
14	23A91513	OE	OE-I:MATHEMATICS FOR MACHINE LEARNING AND AI	3	0	0	3	30	70	100
15	23A92503	OE	OE-I:MATERIALS CHARACTERIZATION TECHNIQUES	3	0	0	3	30	70	100
16	23A93504	OE	OE-I:CHEMISTRY OF ENERGY SYSTEMS	3	0	0	3	30	70	100
17	23A94505	OE	OE-I:ENGLISH FOR COMPETITIVE EXAMINATIONS	3	0	0	3	30	70	100
18	23A95507	OE	OE-I:ENTREPRENEURSHIP AND NEW VENTURE CREATION	3	0	0	3	30	70	100
19	23A33505	PC	ARTIFICIAL INTELLIGENCE LAB	0	0	3	1.5	30	70	100
20	23A05524	PC	COMPUTER NETWORKS & INTERNET PROTOCOLS LAB	0	0	3	1.5	30	70	100
21	23A05525	SC	FULL STACK DEVELOPMENT-II (SKILL ENHANCEMENT COURSE)	0	1	2	2	30	70	100
22	23A04526	SC	TINKERING LAB	0	0	2	1	30	70	100
23	23A99507	MC(C)	EVALUATION OF COMMUNITY SERVICE INTERNSHIP	-	-	-	2	0	50	50

III B.Tech I
Semester Syllabus

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A33301) ARTIFICIAL INTELLIGENCE

Course Category	**Engineering Science (ES)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. The student should be made to study the concepts of Artificial Intelligence.
2. The student should be made to learn the methods of solving problems using Artificial Intelligence.
3. The student should be made to introduce the concepts of Expert Systems.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.
5. To learn different knowledge representation techniques

UNIT-I INTRODUCTION

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT-II SEARCHING & GAME PLAYING

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT-III REPRESENTATION OF KNOWLEDGE

Representation of Knowledge: Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Bayes‘ probabilistic interferences and dempstershafer theory.

UNIT-IV LOGIC CONCEPTS

Logic concepts: First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT-V EXPERT SYSTEMS

Architecture of expert systems, Roles of expert systems – Knowledge Acquisition Meta knowledge Heuristics. Typical expert systems – MYCIN, DART, XCON: Expert systems shells.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. S. Russel and P. Norvig, Artificial Intelligence – A Modern Approach, SecondEdition, Pearson Education.
2. Kevin Night and Elaine Rich, Nair B., Artificial Intelligence (SIE), Mc Graw Hill

REFERENCE BOOKS:

1. David Poole, Alan Mack worth, Randy Goebel, Computational Intelligence: a logical approach, Oxford University Press.
2. G. Luger, Artificial Intelligence: Structures and Strategies for complex problemsolving, Fourth Edition, Pearson Education.
3. J. Nilsson, Artificial Intelligence: A new Synthesis, Elsevier Publishers.
4. Artificial Intelligence, SarojKaushik, CENGAGE Learning.

e-Resources and Digital Material:

1. https://ai.google/
2. https://swayam.gov.in/nd1_noc19_me71/preview

COURSE OUTCOMES:

1. Learning About Basics of Artificial Intelligence
2. Apply Searching Techniques for Solving a Problem
3. Learning About Knowledge Representation and Predicate Logic to Apply in Problem Solving
4. To Understand and Learn About Logic Concept and Reinforcement Learning
5. To Learn About Architecture and Implementation About Expert Systems

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05519) COMPUTER NETWORKS & INTERNET PROTOCOLS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Understand the basic concepts of Computer Networks.
2. Introduce the layered approach for design of computer networks.
3. Expose the network protocols used in Internet environment.
4. Explain the format of headers of IP, TCP and UDP.
5. Familiarize with the applications of Internet.
6. Elucidate the design issues for a computer network.

UNIT-I COMPUTER NETWORKS AND THE INTERNET

What Is the Internet, Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks (Textbook 2), Reference Models, Multimedia Networks, Guided Transmission Media, Wireless Transmission (Textbook 1)

UNIT-II THE DATA LINK LAYER, ACCESS NETWORKS, AND LANS

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols (Textbook 1) Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page (Packet) (Textbook 2).

UNIT-III THE NETWORK LAYER

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1).

UNIT-IV THE TRANSPORT LAYER

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1).

UNIT-V THE APPLICATION LAYER

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS The Internet's Directory Service, Peer-to-Peer Applications, Video Streaming and Content Distribution Networks (Textbook 2).

TEXT BOOKS:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 6th Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2019.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Publishers, 2016.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/106105183/25
2. https://www.nptelvideos.in/2012/11/computer-networks.html
3. https://nptel.ac.in/courses/106105183/3

COURSE OUTCOMES:

1. Identify the software and hardware components of a computer network
2. Design software for a computer network
3. Develop error, routing, and congestion control algorithms
4. Assess critically the existing routing protocols
5. Explain the functionality of each layer of a computer network
6. Choose the appropriate transport protocol based on the application requirements

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05520) AUTOMATA THEORY AND COMPILER DESIGN

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Able to understand the concept of abstract machines, construct FA, Regular Expressions for the regular languages and equivalent FSMs
2. Able to construct pushdown automata equivalent to Context free Grammars, construct Turing Machines and understand undecidability
3. Emphasize the concepts learnt in phases of compiler, lexical analyser and Top-down parser.
4. Able to understand the concepts of Bottom-up parser, Intermediate Code Generation
5. Able to understand the concepts of Code optimizer and Code Generation.

UNIT-I INTRODUCTION TO AUTOMATA AND REGULAR EXPRESSIONS

Introduction to Automata and Regular Expressions: Introduction, Alphabets, Strings and Languages, Chomsky Hierarchy, Automata and Grammars, Regular Grammar and Language, Finite Automata, Deterministic finite Automata (DFA), Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Converting Regular Grammar and Expression into Finite Automata, Pumping lemma for regular sets, Closure properties of regular sets (Without proof).

UNIT-II CONTEXT FREE GRAMMARS AND PUSHDOWN AUTOMATA

Context Free Grammars and Pushdown Automata: Context Free Language, Context Free Grammar, Derivation and Parse tree, Ambiguity, Simplification of CFG's, Chomsky Normal Form, Greibach Normal Form, Push Down Automat (PDA), Design of PDA, Equivalence of PDA and CFL/CFG

UNIT-III TURING MACHINES AND INTRODUCTION TO COMPILERS

Turing Machines and Introduction to Compilers: Turing Machine, TM Model, Language acceptance, Design of Turing Machine, Compilers, Phases of Compiler, The role of Lexical Analyzer, Input Buffering.

UNIT-IV PARSERS AND INTERMEDIATE CODE GENERATION

Parsers and Intermediate Code Generation: Parser, Top-Down parsers: Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers: Shift-Reduce Parsing, LR parsers, Intermediate Code Generation: Three address codes.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V CODE OPTIMIZATION AND CODE GENERATION

Code Optimization and Code Generation: Code Optimization: Peephole optimization, Basic blocks and flow graphs, DAG, Principles of Source Code Optimization, Code Generation: Issues in Design of Code Generation, Simple Code Generator.

TEXT BOOKS:

1. Introduction to Automata theory languages and Computation, Hopcroft H.E. and Ullman Jeffrey.D, 3/e, 2006, Pearson Education, New Delhi, India
2. Mishra K L P and Chandrasekaran N, Theory of Computer Science - Automata, Languages and Computation, 2/e, 2007, PHI, New Delhi, India
3. Compilers: Principles, Techniques, and Tools, Updated 2e July 2023 Alfred V. Aho , Monica S. Lam, Ravi Sethi , Jeffrey D. Ullman , Sorav Bansal

REFERENCE BOOKS:

1. Introduction to Languages and Theory of Computation, John C Martin, 1/e, 2009, Tata McGraw Hill Education, Hyderabad, India.
2. Introduction to Theory of Computation, Sipser, 2/e, 2005, Thomson, Australia.
3. Compiler Construction: Principles And Practice, Kenneth C. Louden, Thomson/ Delmar Cengage Learning, 2006.
4. Lex &yacc, Doug Brown, John Levine and Tony Mason, 2 nd Edition, O'reilly Media
5. Engineering a compiler, Keith Cooper and Linda Torczon, 2 nd Edition, Morgan Kaufmann, 2011.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc21_cs19/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs57/preview

COURSE OUTCOMES:

1. Demonstrate knowledge on Automata Theory, Regular Expression and Analyze and Design of finite automata, and prove equivalence of various finite automata
2. Demonstrate knowledge on context free grammar, Analyze and design of PDA and TM
3. Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.
4. Ability to implement semantic rules into a parser that performs attribution while parsing and apply error detection and correction methods.
5. Apply the code optimization techniques to improve the space and time complexity of programs while programming and Ability to design a compiler.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05517) INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Introduce fundamental quantum concepts like superposition and entanglement.
2. Understand theoretical structure of qubits and quantum information
3. Explore conceptual challenges in building quantum computers.
4. Explain principles of quantum communication and computing
5. Examine real-world applications and the future of quantum technologies.

UNIT-I INTRODUCTION TO QUANTUM THEORY AND TECHNOLOGIES

Introduction to Quantum Theory and Technologies: The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, Why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

UNIT-II THEORETICAL STRUCTURE OF QUANTUM INFORMATION SYSTEMS

Theoretical Structure of Quantum Information Systems: What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (nonengineering view),Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III BUILDING A QUANTUM COMPUTER – THEORETICAL CHALLENGES AND REQUIREMENTS

Building a Quantum Computer – Theoretical Challenges and Requirements: What is required to build a quantum computer (conceptual overview),Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers: Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison),Superconducting circuits, Trapped ions, Photonics, Visionvs reality: what's working and what remains elusive, The role of quantum software in managing theoretical complexities

UNIT-IV QUANTUM COMMUNICATION AND COMPUTING – THEORETICAL PERSPECTIVE

Quantum Communication and Computing – Theoretical Perspective: Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD),Role of Entanglement in Communication, The Idea of the Quantum Internet Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once),Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

UNIT-V APPLICATIONS, USE CASES, AND THE QUANTUM FUTURE

Applications, Use Cases, and the Quantum Future: Real-world application domains: Healthcare (drug discovery),Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, PsiQuantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race

TEXT BOOKS:

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019

REFERENCE BOOKS:

1. David McMahon, Quantum Computing Explained, Wiley, 2008
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.
4. Alastair I.M. Rae, Quantum Physics: A Beginner's Guide, Oneworld Publications, Revised Edition, 2005.

5. Eleanor G. Rieffel, Wolfgang H. Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
6. Leonard Susskind, Art Friedman, Quantum Mechanics: The Theoretical Minimum, Basic Books, 2014.
7. Bruce Rosenblum, Fred Kuttner, Quantum Enigma: Physics Encounters Consciousness, Oxford University Press, 2nd Edition, 2011.

e-Resources and Digital Material:

1. IBM Quantum Experience and Qiskit Tutorials
2. Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
3. edX – The Quantum Internet and Quantum Computers
4. YouTube – Quantum Computing for the Determined by Michael Nielsen
5. Qiskit Textbook – IBM Quantum

COURSE OUTCOMES:

1. Explain core quantum principles in a non-mathematical manner
2. Compare classical and quantum information systems
3. Identify theoretical issues in building quantum computers.
4. Discuss quantum communication and computing concepts
5. Recognize applications, industry trends, and career paths in quantum technology

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05521) PE-I:OBJECT ORIENTED ANALYSIS AND DESIGN

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Understand the basic concepts of object-oriented techniques
2. Build the Model of the software system using UML diagrams
3. Elucidate design patterns as templates for good design
4. Learn the object-oriented methodology in software design
5. Explore testing techniques for object-oriented software .

UNIT-I INTRODUCTION

The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems.

Case Study: System Architecture: Satellite-Based Navigation.

UNIT-II INTRODUCTION TO UML

Importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.

Case Study: Control System: Traffic Management.

UNIT-III CLASS & OBJECT DIAGRAMS

Terms, concepts, Modelling techniques for Class & Object Diagrams. Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Case Study: AI: Cryptanalysis.

UNIT-IV BASIC BEHAVIOURAL MODELLING-I

Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams.

Case Study: Web Application: Vacation Tracking System.

UNIT-V ADVANCED BEHAVIOURAL MODELLING

Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams

Case Study: Weather Forecasting

TEXT BOOKS:

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: Managerial Economics and Financial Analysis, Cengage Publications, New Delhi 2011
2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
3. Prof.J.V.Prabhakararao, Prof. P. Venkatarao. Managerial Economics and Financial Analysis, Ravindra Publication

REFERENCE BOOKS:

1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012

COURSE OUTCOMES:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05522) PE-I:SOFT COMPUTING

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION TO SOFT COMPUTING

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta-Perceptron Network-Adaline Network-Madaline Network.

UNIT-II ARTIFICIAL NEURAL NETWORKS

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT-III FUZZY SYSTEMS

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT-IV GENETIC ALGORITHMS

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators - Convergence of Genetic Algorithm

UNIT-V HYBRID SYSTEMS

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction – Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

TEXT BOOKS:

1. S. Rajsekaran& G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, 4th Edition, Prentice Hall of India,2003.

REFERENCE BOOKS:

1. Timothy J Ross ,"Fuzzy Logic with Engineering Applications", 3rd Edition, John Wiley and Sons,2016.

2. David E. Goldberg ,"Genetic Algorithm in Search Optimization and Machine Learning "Adission Wesley,2009.
3. Karray, Soft Computing and Intelligent Systems Design: Theory, Tools and Applications‖, 1st Edition, Pearson Education,2009.

COURSE OUTCOMES:

1. Learn soft computing techniques and their applications.
2. Analyze various neural network architectures.
3. Define the fuzzy systems.
4. Understand the genetic algorithm concepts and their applications
5. Identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A04519) PE-I:MICROPROCESSORS AND MICROCONTROLLERS

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
2. To get familiar with 8086 programming concepts, instruction set, and assembly language development tools
3. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

UNIT-I 8086 ARCHITECTURE

:

ain features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II 8086 PROGRAMMING

:

Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III 8086 INTERFACING

:

Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT-IV MICROCONTROLLER

Microcontroller - Architecture of 8051 Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V INTERFACING MICROCONTROLLE

Interfacing Microcontroller - Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TEXT BOOKS:

1. Microprocessors and Interfacing Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition,1994.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012

REFERENCE BOOKS:

1. Ramesh S Gaonkar, Microprocessor Architecture Programming and Applications with the 8085, 6th edition, Penram International Publishing, 2013
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.

COURSE OUTCOMES:

1. Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.
2. Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. Know the interfacing of 8086 with memory, peripherals, and controllers for various applications
4. Learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A05523) PE-I:DATA WAREHOUSING & DATA MINING

Course Category	**Professional Elective (PE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Familiarize with mathematical foundations of data mining tools.
2. Introduce classical models and algorithms in data warehouses and data mining.
3. Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Explore data mining techniques in various applications like social, scientific and environmental context.

UNIT-I BASIC CONCEPTS

Data Warehousing Components - building a Data Warehouse Database Architectures for Parallel Processing Parallel DBMS Vendors- Multidimensional Data Model - Data Warehouse Schemas for Decision Support, Concept Hierarchies - Characteristics of OLAP Systems - Typical OLAP Operations, OLAP and OLTP.

UNIT-II INTRODUCTION TO DATA MINING SYSTEMS

Introduction to Data Mining Systems - Knowledge Discovery Process Data Mining Techniques - Issues applications- Data Objects and attribute types, Statistical description of data. Data Preprocessing Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT-III MINING FREQUENT PATTERNS

Mining Frequent Patterns, Associations and Correlations Mining Methods- Pattern Evaluation Method - Pattern Mining in Multilevel, Multi Dimensional Space, Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

UNIT-IV DECISION TREE INDUCTION

Decision Tree Induction Bayesian Classification Rule Based Classification, Classification by Back Propagation - Support Vector Machines Lazy Leaners - Medel Evaluation and Selection- Techniques to improve Classification Accuracy. Clustering Techniques - Cluster analysis-Partitioning Methods Hierarchical Methods Density Based Methods -. Grid Based Methods Evaluation of clustering - Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT-V WEKA TOOL

Datasets Introduction, Iris plants database. Breast cancer database, Auto imports database Introduction to WEKA, The Explorer Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms. Association rule learners.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber Data Mining Concepts arid Techniques Third Edition Elsevier

REFERENCE BOOKS:

1. Alex Berson and Stephen J.Smith. Data ñ‘arehousirig, Data Mining & OL.API. Tata McGraw — I il I Edition, 34th Reprint 201d.
2. K.P. Soman. Shyam Diwakar and X’. Ajax, I nsipht inti› Data Mining Theory and Practice. Eastern FcoComy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, mata Mining: Praci ical ’lachine Learning ’ools arid I echniques, Elsevier. Second Edition.

COURSE OUTCOMES:

1. Design a Data warehouse system and perform business analysis with OLAP tools
2. Apply suitable pie-processing and visualization techniques for data analysis
3. Apply frequent pattern and association rule mining techniques for data analysis
4. Design appropriate classification and Clustering techniques for data analysis
5. Infer knowledge from raw data

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A01501) OE-I:GREEN BUILDINGS

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To understand the fundamental concepts of green buildings, their necessity, and sustainable features.
2. To analyze green building concepts, rating systems, and their benefits in India
3. To apply green building design principles, energy efficiency measures, and renewable energy sources.
4. To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.
5. To assess material conservation strategies, waste management, and indoor environmental quality in green buildings.

UNIT-I UNIT – I

Introduction to Green Building– Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing A Green Building, Important Sustainable Features for Green Buildings.

UNIT-II UNIT – II

Green Building Concepts and Practices– Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency

UNIT-III UNIT III

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.

UNIT-IV UNIT – IV

Air Conditioning– Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V UNIT – V

Material Conservation– Handling of Non-Process Waste, Waste Reduction During Construction, Materials With Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.

TEXT BOOKS:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by tom woolley and Sam kimings, 2009.

REFERENCE BOOKS:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009
3. Energy Conservation Building Code ECBC-2020, published by BEE

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/courses/105/102/105102195/

COURSE OUTCOMES:

1. Understand the importance of green buildings, their necessity, and sustainable features.
2. Analyze various green building practices, rating systems, and their impact on environmental sustainability.
3. Apply principles of green building design to enhance energy efficiency and incorporate renewable energy sources.
4. Evaluate HVAC systems, energy-efficient air conditioning techniques, and their role in sustainable building design.
5. Assess material conservation techniques, waste reduction strategies, and indoor air quality management in green buildings.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A01502) OE-I:CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To understand project management fundamentals, organizational structures, and leadership principles in construction
2. To analyze manpower planning, equipment management, and cost estimation in civil engineering projects.
3. To apply planning, scheduling, and project management techniques such as CPM and PERT.
4. To evaluate various contract types, contract formation, and legal aspectsin construction management.
5. To assess safety management practices, accident prevention strategies, and quality management systemsin construction.

UNIT-I UNIT – I

Introduction: Project forms, Management Objectives and Functions; Organizational Chart of A Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership and Team - Work; Ethics, Morale, Delegation and Accountability.

UNIT-II UNIT – II

Man and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.

UNIT-III UNIT – III

Planning, Scheduling andProject Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network-formulation and Time Computation.

UNIT-IV UNIT – IV

Contracts: Types of Contracts, formation of Contract – Contract Conditions – Contract forLabour, Material, Design, Construction – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V UNIT – V

Safety Management – Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.

TEXT BOOKS:

1. Construction Project Management, SK. Sears, GA. Sears, RH. Clough, John Wiley and Sons, 6th Edition, 2016.
2. Construction Project Scheduling and Control by Saleh Mubarak, 4th Edition, 2019
3. Pandey, I.M (2021) Financial Management 12th edition. Pearson India Education Services Pvt. Ltd.

REFERENCE BOOKS:

1. Brien, J.O. andPlotnick, F.L., CPMin Construction Management, Mcgraw Hill, 2010
2. Punmia, B.C., andKhandelwal, K.K., Project Planning and control with PERT and CPM, Laxmi Publications, 2002
3. Construction Methods and Management: Pearson New International Edition 8 th Edition Stephens Nunnally.
4. Rhoden, M and Cato B, Construction Management andOrganisational Behaviour, WileyBlackwell, 2016.

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/courses/105/104/105104161/
2. https://archive.nptel.ac.in/courses/105/103/105103093/

COURSE OUTCOMES:

1. Understand (Cos)project management fundamentals, organizational structures, and leadership principles in construction.
2. Analyze manpower planning, equipment management, and cost estimationin civil engineering projects.
3. Apply planning, scheduling, and project management techniques such as CPM and PERT.
4. Evaluate various contract types, contract formation, and legal aspectsin construction management.
5. Assess safety management practices, accident prevention strategies, and quality management systems in construction.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A02503) OE-I:ELECTRICAL SAFETY PRACTICES AND STANDARDS

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

UNIT-I INTRODUCTION TO ELECTRICAL SAFETY

Fundamentals of Electrical safety -Electric Shock-physiological effects of electric current Safety requirements Hazards of electricity-Arc-Blast-Causes for electrical failure.

UNIT-II SAFETY COMPONENTS

Introduction to conductors and insulators- voltage classification -safety against over voltages- safety against static electricity-Electrical safety equipment's Fireextinguishers for electrical safety.

UNIT-III GROUNDING

General requirements for grounding and bonding- Definitions- System grounding Equipment grounding -The Earth-Earthing practices-Determining safe approach distance Determining archazard category

UNIT-IV SAFETY PRACTICES

General first aid-Safety in handling hand held electrical appliances tools-Electrical safety in train stations-swimming pools,external lighting installations,medical locations-Case studies.

UNIT-V STANDARDS FOR ELECTRICAL SAFETY

Electricity Acts- Rules & regulations- Electrical standards-NFPA 70 E-OSHA standards IEEE standards-National Electrical Code 2005 – National Electric Safety code NESC - Statutory requirements from electrical inspectorate

TEXT BOOKS:

1. MassimoA.G.Mitolo, ElectricalSafetyofLow-VoltageSystems,McGrawHill,USA,2009.
2. MohamedEl-Sharkawi, ElectricSafety-PracticeandStandards,CRCPress,USA,2014

COURSE OUTCOMES:

1. Understanding the Fundamentals of Electrical Safety
2. Identifying and Applying Safety Components
3. Analyzing Grounding Practices and Electrical Bonding
4. Applying Safety Practices in Electrical Installations and Environments

5. Evaluating Electrical Safety Standards and Regulatory Compliance

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A03504) OE-I:SUSTAINABLE ENERGY TECHNOLOGIES

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. demonstrate the importance the impact of solar radiation, solar PVmodules
2. understand the principles of storage in PV systems
3. discuss solar energy storage systems and their applications.
4. get knowledge in wind energy and bio-mass
5. gain insights in geothermal energy, ocean energy and fuel cells.

UNIT-I UNIT – 1

SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

SOLAR PV MODULES AND PV SYSTEMS:PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance.

UNIT-II UNIT – 2

STORAGE IN PV SYSTEMS: Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT-III UNIT – 3

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-IV UNIT – 4

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects

UNIT-V UNIT – 5

GEOTHERMAL ENERGY: Origin, Applications, Types of Geothermal Resources, Relative Merits

OCEAN ENERGY: Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges

FUEL CELLS: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

TEXT BOOKS:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH
2. Non-Conventional Energy Resources- Khan B.H/ Tata McGraw Hill, New Delhi, 2006

REFERENCE BOOKS:

1. Principles of Solar Engineering - D.Yogi Goswami, Frank Krieth& John F Kreider / Taylor &Francis
2. Non-Conventional Energy - Ashok V Desai /New Age International (P) Ltd
3. Renewable Energy Technologies -Ramesh & Kumar /Narosa
4. Non-conventional Energy Source- G.D Roy/Standard Publishers

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/112106318
2. https://youtube.com/playlistlist=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-mwIa2X-SuSiNy13
3. https://youtube.com/playlistlist=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=Apfjx6oDfz1Rb_N3
4. https://youtu.be/zx04Kl8y4dEsi=VmOvp_OgqisILTAF

COURSE OUTCOMES:

1. Illustrate the importance of solar radiation and solar PV modules
2. Discuss the storage methods in PV systems
3. Explain the solar energy storage for different applications
4. Understand the principles of wind energy, and bio-mass energy.
5. Attain knowledge in geothermal energy, ocean energy and fuel cells.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A04527) OE-I:ELECTRONIC CIRCUITS

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To understand semiconductor diodes, their characteristics and applications.
2. To explore the operation, configurations, and biasing of BJTs.
3. To study the operation, analysis, and coupling techniques of BJT amplifiers.
4. To learn the operation, applications and uses of feedback amplifiers and oscillators.
5. To analyze the characteristics, configurations, and applications of operational amplifiers.

UNIT-I UNIT-I

Semiconductor Diode and Applications: Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Varactor Diode, Photo Diode .

UNIT-II UNIT-II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

UNIT-III UNIT-III

Single stage amplifiers: Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.

Multistage amplifiers: Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier; Multistage RC coupled BJT amplifier (Qualitative treatment only)

UNIT-IV UNIT-IV

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).

Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge Oscillator.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-V UNIT-V

Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp : Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

TEXT BOOKS:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press. 2008.

REFERENCE BOOKS:

1. Electronics Devices and Circuits Theory, R.L.Boylestad, LousisNashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012
3. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press

COURSE OUTCOMES:

1. Understand semiconductor diodes, their characteristics and applications.
2. Explore the operation, configurations, and biasing of BJTs.
3. Gain knowledge about the operation, analysis, and coupling techniques of BJT amplifiers.
4. Learn the operation, applications and uses of feedback amplifiers and oscillators.
5. Analyze the characteristics, configurations, and applications of operational amplifiers.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A91513) OE-I:MATHEMATICS FOR MACHINE LEARNING AND AI

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.
2. To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.
3. To equip students with optimization techniques and graph-based methods used in AI applications.
4. To develop critical problem-solving skills for analysing mathematical formulations in AI/ML.

UNIT-I LINEAR ALGEBRA FOR MACHINE LEARNING(08)

Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigenvalues, eigenvectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT-II PROBABILITY AND STATISTICS FOR AI(08)

Probability distributions: Gaussian, Binomial, Poisson. Bayes' Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP).Entropy and Kullback-Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT-III OPTIMIZATION TECHNIQUES FOR ML(08)

Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization: Lagrange multipliers and KKT conditions.Gradient Descent and its variants (Momentum, Adam) Newton's method, BFGS method.

UNIT-IV VECTOR CALCULUS & TRANSFORMATIONS(08)

Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT-V GRAPH THEORY FOR AI(08)

Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

TEXT BOOKS:

1. Mathematics for Machine Learning by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge University Press, 2020.
2. Pattern Recognition and Machine Learningby Christopher Bishop, Springer.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

REFERENCE BOOKS:

1. Gilbert Strang, Linear Algebra and Its Applications, Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, Graph Theory and Its Applications, CRC Press, 2018.

e-Resources and Digital Material:

1. MIT– Mathematics for Machine Learning https://ocw.mit.edu
2. Stanford CS229 – Machine Learning Course https://cs229.stanford.edu/
3. DeepAI – Mathematical Foundations for AI https://deepai.org

COURSE OUTCOMES:

1. Apply linear algebra concepts to ML techniques like PCA and regression. L3 (Apply)
2. Analyze probabilistic models and statistical methods for AI applications. L4 (Analyze)
3. Implement optimization techniques for machine learning algorithms. L3 (Apply)
4. Utilize vector calculus and transformations in AI-based models. L3 (Apply)
5. Develop graph-based AI models using mathematical representations. L5 (Evaluate)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A92503) OE-I:MATERIALS CHARACTERIZATION TECHNIQUES

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To provide exposure to different characterization techniques.
2. To explain the basic principles and analysis of different spectroscopic techniques.
3. To elucidate the working of Scanning electron microscope - Principle, limitations and applications.
4. To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.
5. To educate the uses of advanced electric and magnetic instruments for characterization.

UNIT-I STRUCTURE ANALYSIS BY POWDER X-RAY DIFFRACTION

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT-II MICROSCOPY TECHNIQUE -1 –SCANNING ELECTRON MICROSCOPY (SEM)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM

UNIT-III MICROSCOPY TECHNIQUE -2 - TRANSMISSION ELECTRON MICROSCOPY (TEM)

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy

UNIT-IV SPECTROSCOPY TECHNIQUES

Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT-V ELECTRICAL & MAGNETIC CHARACTERIZATION TECHNIQUES

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2013
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008

REFERENCE BOOKS:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity& Stuart R Stocks, Prentice Hall , 2001 – Science.
3. Practical Guide to Materials Characterization: Techniques and Applications - Khalid Sultan – Wiley – 2021.
4. Materials Characterization Techniques -Sam Zhang, Lin Li, Ashok Kumar -CRC Press - 2008

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/115/103/115103030/
2. https://nptel.ac.in/content/syllabus_pdf/113106034.pdf
3. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/

COURSE OUTCOMES:

1. Analyze the crystal structure and crystallite size by various methods L1,L2, L3, L4
2. Analyze the morphology of the sample by using a Scanning Electron Microscope L1,L2, L4
3. Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope L1,L2, L3
4. Explain the principle and experimental arrangement of various spectroscopic techniques L1,L2
5. dentify the construction and working principle of various Electrical & Magnetic Characterization technique L1,L2

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A93504) OE-I:CHEMISTRY OF ENERGY SYSTEMS

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
2. To understand the basic concepts of processing and limitations of Fuel cells & their applications
3. To impart knowledge to the students about fundamental concepts of photo chemical cells, reactions and applications
4. Necessarily of harnessing alternate energy resources such as solar energy and its basic concepts.
5. To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method.

UNIT-I ELECTROCHEMICAL SYSTEMS

Galvanic cell, Nernst equation, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries- Introduction ,Lead-acid ,Nickel- cadmium, Lithium ion batteries and their applications.

UNIT-II FUEL CELLS

Fuel cell- Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT-III PHOTO AND PHOTO ELECTROCHEMICAL CONVERSIONS

Photochemical cells Introduction and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT-IV SOLAR ENERGY

Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT-V HYDROGEN STORAGE

Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, Other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel , and Organic hydrogen carriers.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Physical chemistry by Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins

REFERENCE BOOKS:

1. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services And corporation)
2. Hand book of solar energy and applications by ArvindTiwari and Shyam.
3. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
4. Hydrogen storage by Levine Klebonoff

COURSE OUTCOMES:

1. Solve the problems based on electrode potential, Describe the Galvanic Cell Differentiate between Lead acid and Lithium ion batteries, Illustrate the electrical double layer
2. Describe the working Principle of Fuel cell, Explain the efficiency of the fuel cell Discuss about the Basic design of fuel cells, Classify the fuel cell
3. Differentiate between Photo and Photo electrochemical Conversions, Illustrate the photochemical cells, Identify the applications of photochemical reactions, Interpret advantages of photoelectron catalytic conversion.
4. Apply the photo voltaic technology, Demonstrate about solar energy and prospects Illustrate the Solar cells, Discuss about concentrated solar power
5. Differentiate Chemical and Physical methods of hydrogen storage, Discuss the metal organic frame work, Illustrate the carbon and metal oxide porous structures Describe the liquification methods.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A94505) OE-I:ENGLISH FOR COMPETITIVE EXAMINATIONS

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To enable the students to learn about the structure of competitive English
2. To understand the grammatical aspects and identify the errors
3. To enhance verbal ability and identify the errors
4. To improve word power to answer competitive challenges
5. To make them ready to crack competitive exams

UNIT-I GRAMMAR-1

GRAMMAR-1: Nouns-classification-errors-Pronouns-types-errors-Adjectives-types-errors-Articles-definite-indefinite Degrees of Comparison-Adverbs-types- errors-Conjunctions-usage Prepositions-usage-Tag Questions, types-identifying errors- Practice

UNIT-II GRAMMAR-2

GRAMMAR-2: Verbs-tenses- structure-usages- negatives- positives- time adverbs-Sequence of tenses--If Clause Voice-active voice and passive voice- reported Speech-Agreement- subject and verb-Modals-Spotting Errors-Practices

UNIT-III VERBAL ABILITY

VERBAL ABILITY: Sentence completion-Verbal analogies-Word groups-Instructions-Critical reasoning-Verbal deduction Select appropriate pair-Reading Comprehension-Paragraph-Jumbles-Selecting the proper statement by reading a given paragraph.

UNIT-IV READING COMPREHENSION AND VOCUBULARY

READING COMPREHENSION AND VOCUBULARY: Competitive Vocabulary :Word Building Memory techniques-Synonyms, Antonyms, Affixes-Prefix &Suffix-One word substitutes-Compound words-Phrasal Verbs-Idioms and Phrases-Homophones Linking Words-Modifiers-Intensifiers - Mastering Competitive Vocabulary- Cracking the unknowing passage-speed reading techniques-Skimming & Scanning-types of answering Elimination methods

UNIT-V WRITING FOR COMPETITIVE EXAMINATIONS

WRITING FOR COMPETITIVE EXAMINATIONS: Punctuation- Spelling rules- Word order-Sub Skills of Writing- Paragraph meaning-salient features types - Note-making, Note-taking, summarizing-precise writing- Paraphrasing-Expansion of proverbs Essay writing-types

TEXT BOOKS:

1. Wren & Martin, English for Competitive Examinations, S.Chand & Co, 2021
2. Objective English for Competitive Examination, Tata McGraw Hill, New Delhi, 2014.

REFERENCE BOOKS:

1. Hari Mohan Prasad, Objective English for Competitive Examination, Tata McGraw Hill, New Delhi, 2014.
2. Philip Sunil Solomon, English for Success in Competitive Exams, Oxford 2016
3. Shalini Verma , Word Power Made Handy, S Chand Publications
4. Neira, Anjana Dev & Co. Creative Writing: A Beginner's Manual. Pearson Education India, 2008.
5. Abhishek Jain,Vocabulary Learning Techniques Vol.I&II,RR Global Publishers 2013.
6. Michel Swan, Practical English Usage,Oxford,2006.

e-Resources and Digital Material:

1. https://www.grammar.cl/english/parts-of-speech.htm
2. https://academicguides.waldenu.edu/writingcenter/grammar/partsofspeech
3. https://learnenglish.britishcouncil.org/grammar/english-grammar-reference/active-passive-voice
4. https://languagetool.org/insights/post/verb-tenses/
5. https://www.britishcouncil.in/blog/best-free-english-learning-resources-british-council
6. https://www.careerride.com/post/social-essays-for-competitive-exams-586.aspx

COURSE OUTCOMES:

1. Identify the basics of English grammar and its importance L1, L2
2. Explain the use of grammatical structures in sentences L1, L2
3. Demonstrate the ability to use various concepts in grammar and vocabulary and their applications in everyday use and in competitive exams L3
4. Analyze an unknown passage and reach conclusions about it. L4
5. Choose the appropriate form of verbs in framing sentences L5
6. Develop speed reading and comprehending ability thereby perform better in competitive exams L3

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
3	0	0	3

(23A95507) OE-I:ENTREPRENEURSHIP AND NEW VENTURE CREATION

Course Category	**Open Elective (OE)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To foster an entrepreneurial mind-set for venture creation and intrapreneurial leadership.
2. To encourage creativity and innovation
3. To enable them to learn pitching and presentation skills
4. To make the students understand MVP development and validation techniques to determine Product-Market fit and Initiate Solution design, Prototype for Proof of Concept.
5. To enhance the ability of analyzing Customer and Market segmentation, estimate Market size, develop and validate Customer Persona

UNIT-I ENTREPRENEURSHIP FUNDAMENTALS AND CONTEXT

Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models in each and their role in economic development. An understanding of how to build entrepreneurial mindset, skill sets, attributes and networks while on campus. Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16industries to choose from), Venture Activity

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

Understand theconcept of Entrepreneur and Entrepreneurship in India

Analyze recent trends in Entrepreneurship role in economic development

Develop a creative mind set and personality in starting a business.

UNIT-II PROBLEM & CUSTOMER IDENTIFICATION

Understanding and analysing the macro-Problem and Industry perspective - technological, socioeconomic and urbanization trends and their implication on new opportunities - Identifying passion - identifying and defining problem using Design thinking principles - Analysing problem and validating with the potential customer - Understanding customer segmentation, creating and validating customer personas. Core Teaching Tool: Several types of activities including Class, game, Gen AI, Get out of the Building‘ and Venture Activity.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

Understand the problem and Customer identification. B.Tech.

Analyze problem and validating with potential customer

Evaluate customer segmentation and customer personas

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

UNIT-III SOLUTION DESIGN, PROTOTYPING & OPPORTUNITY ASSESSMENT AND SIZING

Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customers needs and create a strong value proposition - Understanding prototyping and Minimum Viable product (MVP) - Developing a feasibility prototype with differentiating value, features and benefits - Assess relative market position via competition analysis - Sizing the market and assess scope and potential scale of the opportunity. Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to
Analyze jobs-to-be-done
Evaluate customer needs to create a strong value proposition
Design and draw prototyping and MVP

UNIT-IV BUSINESS & FINANCIAL MODEL, GO-TO-MARKET PLAN

Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Importance of Build - Measure – Lean approach.

Business planning: components of Business plan- Sales plan, People plan and financial plan. Financial Planning: Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics and analysing financial performance.

Introduction to Marketing and Sales, Selecting the Right Channel, creating digital presence, building customer acquisition strategy.

Choosing a form of business organization specific to your venture, identifying sources of funds: Debt& Equity, Map the Start-up Life-cycle to Funding Options.

Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to:
Understand lean approach in business models
Apply business plan, sales plan and financial plan
Analyze financial planning, marketing channels of distribution.
Design their own venture and source of funds.

UNIT-V SCALE OUTLOOK AND VENTURE PITCH READINESS

Understand and identify potential and aspiration for scale vis-a-vis your venture idea. Persuasive Storytelling and its key components. Build an Investor ready pitch deck. Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

L**EARNING OUTCOMES**

At the end of the Unit, the learners will be able to
Understand aspiration for scale
Analyze venture idea and its key components
Evaluate and build investors ready pitch

REFERENCE BOOKS:

1. Simon Sinek,Start with Why, Penguin Books limited. (2011)
2. Brown Tim,Change by Design Revised & Updated: How Design Thinking
3. Transforms Organizations and Inspires Innovation, Harper Business.(2019)
4. Namita Thapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited
5. Saras D. Sarasvathy, (2008) Effectuation: Elements of Entrepreneurial Expertise, Elgar Publishing Ltd.

COURSE OUTCOMES:

1. Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship L
2. Comprehend the process of problem-opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution L
3. Analyze and refine business models to ensure sustainability and profitability L3
4. Build Prototype for Proof of Concept and validate MVP of their practice venture idea L4
5. Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture L5
6. Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders L6

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A33505) ARTIFICIAL INTELLIGENCE LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Professional Ethics**

COURSE OBJECTIVES:

1. The student should be made to study the concepts of Artificial Intelligence.
2. The student should be made to learn the methods of solving problems using Artificial Intelligence.
3. The student should be made to introduce the concepts of Expert Systems and machine learning.

1.Write a Program to Implement Breadth First Search using Python.

2. Write a program to implement Best First Searching Algorithm

3. Write a Program to Implement Depth First Search using Python.

4. Write a program to implement the Heuristic Search

5. Write a python program to implement A* and AO* algorithm. (Ex: find the shortest path)

6. Write a Program to Implement Water-Jug problem using Python.

7. Write a Program to Implement Alpha-Beta Pruning using Python.

8. Write a Program to implement 8-Queens Problem using Python.

9. Write a program to schedule a meeting among a 5 busy people using Default Reasoning the output should give the time, place and day of the meeting.

10. Write a program to implement the Unification algorithm

11. Develop a knowledge base system consisting of facts and rules about some specialized knowledge domain

12. Write a program to implement 8 puzzle programs using different heuristics. Using it play the game Tic-Tac-Toe at the end the game the program should display the no. of nodes generated, cutoff values at each stage in the form of a table.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. PrateekJoshi,Artificial Intelligence with Python,Packt Publishing, 2017.
2. Xiao, Perry. Artificial intelligence programming with Python: from zero to hero. John Wiley & Sons, 2022.

REFERENCE BOOKS:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Fourth Edition, Pearson, 2020
2. Martin C. Brown (Author), Python: The Complete Reference McGraw Hill Education, Fourth edition, 2018
3. R. NageswaraRao , Core Python Programming Dreamtech Press India Pvt Ltd 2018.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc19_cs40/preview
2. https://onlinecourses.nptel.ac.in/noc19_cs41/preview

COURSE OUTCOMES:

1. Understand the Mathematical and statistical prospectives of machine learning algorithms through python programming (L2)
2. Appreciate the importance of visualization in the data analytics solution. (L5)
3. Derive insights using Machine learning algorithms (L5)
4. Implement and demonstrate AI and ML algorithms. (L5)
5. Evaluate different algorithms. (L6)

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
0	0	3	1.5

(23A05524) COMPUTER NETWORKS & INTERNET PROTOCOLS LAB

Course Category	**Professional Core course (PC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology
3. Observe its performance
4. To analyze the traffic flow and the contents of protocol frames.
5. Familiarize with the applications of Internet.

List of Experiments:

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.

2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP.

3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.

4. Implement Dijkastra‘s algorithm to compute the shortest path through a network.

5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.

6. Implement distance vector routing algorithm for obtaining routing tables at each node.

7. Implement data encryption and data decryption.

8. Write a program for congestion control using Leaky bucket algorithm.

9. Write a program for frame sorting technique used in buffers.

10. Programs using Wireshark

    i. Packet Capture Using Wire shark

    ii. Starting Wire shark

iii. Viewing Captured Traffic iv. Analysis and Statistics & Filters.

11. How to run Nmap scan .

12. Operating System Detection using Nmap.

13. Do the following using NS2 Simulator

i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

vi. Simulate to Plot Congestion for Different Source/Destination

vii. Simulate to Determine the Performance with respect to transmission of Packets.

TEXT BOOKS:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 6th Edition, PEARSON
2. James F.Kurose, Keith W. Ross, Computer Networking: A Top-Down 6th edition, Pearson, 2019.
3. Computer Networks: A Systems Approach-Bruce Davie, VMware-Larry Peterson, Princeton University-2019.

REFERENCE BOOKS:

1. Computer Networks–B. K. MathanNagan, T. Mahalakshmi- Charulatha Publications PrivateLimited-2019.
2. Computer Networks-Dr.Amol V. Dhumane Nitin N. Sakhare-NiraliPrakashan Publishers-2024.
3. Data Communications and Networking with TCPIP Protocol Suite-Behrouz A. ForouzanMcGraw Hill-6th Edition.

e-Resources and Digital Material:

COURSE OUTCOMES:

1. To understand the working principle of various communication protocols.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

2. To understand the network simulator environment and visualize a network topology and
3. Observe its performance.
4. To analyze the traffic flow and the contents of protocol frames.
5. Critique the existing routing protocols .

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
0	1	2	2

(23A05525) FULL STACK DEVELOPMENT-II (SKILL ENHANCEMENT COURSE)

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Employability**

COURSE OBJECTIVES:

1. Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages
2. Building robust & responsive User Interfaces using popular JavaScript library React.js‘. Building robust backend APIs using Express. js‘
3. Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)
4. Familiarize students with GitHub for remote repository hosting and collaborative development.

Sample Experiments:

1. Introduction to Modern JavaScript and DOM

a. Write a JavaScript program to link JavaScript file with the HTML page

b. Write a JavaScript program to select the elements in HTML page using selectors

c. Write a JavaScript program to implement the event listeners

d. Write a JavaScript program to handle the click events for the HTML button elements

e. Write a JavaScript program to With three types of functions i. Function declaration ii. Function definition iii. Arrow functions

2. Basics of React. js

a. Write a React program to implement a counter button using react class components

b. Write a React program to implement a counter button using react functional components

c. Write a React program to handle the button click events in functional component

d. Write a React program to conditionally render a component in the browser

e. Write a React program to display text using String literals

3. Important concepts of React. js

a. Write a React program to implement a counter button using React use State hook

b. Write a React program to fetch the data from an API using React use Effect hook

c. Write a React program with two react components sharing data using Props.

d. Write a React program to implement the forms in react

e. Write a React program to implement the iterative rendering using map() function.

4. Introduction to Git and GitHub

a. Setup

Install Git on local machine.

Configure Git (user name, email).

Create GitHub account and generate a personal access token.

b. Basic Git Workflow

Create a local repository using git init

Create and add files → git add .

Commit files → git commit -m "Initial commit"

Connect to GitHub remote → git remote add origin

Push to GitHub → git push -u origin main

c. Branching and Collaboration

Create a branch → git checkout -b feature1

Merge branch to main → git merge feature1

Resolve merge conflicts (guided)

5. Upload React Project to GitHub

Create a new React app using npx create-react-app myapp

Initialize a git repo and push to GitHub

Use .gitignore to exclude node_modules

Create multiple branches: feature/navbar, feature/form

Practice merge and pull requests (can use GitHub GUI) .

6. Introduction to Node. js and Express. js

a. Write a program to implement the _hello world‘ message in the route through the browser using Express

b. Write a program to develop a small website with multiple routes using Express. js

c. Write a program to print the _hello world‘ in the browser console using Express. js

d. Write a program to implement the CRUD operations using Express. js

e. Write a program to establish the connection between API and Database using Express – My SQL driver

7. Introduction to My SQL

a. Write a program to create a Database and table inside that database using My SQL Command line client

b. Write a My SQL queries to create table, and insert the data, update the data in the table

c. Write a My SQL queries to implement the subqueries in the My SQL command line client d. Write a My SQL program to create the script files in the My SQL workbench

e. Write a My SQL program to create a database directory in Project and initialize a database. sql file to integrate the database into API

8. Team Collaboration Using GitHub o Form groups of 2–3 students

Create a shared GitHub repo

Assign tasks and work in branches

Use Issues, Pull Requests, and Code R

Document code with README.md

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

TEXT BOOKS:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
4. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon
5. AZAT MARDAN, Full Stack Java Script: Learn Back bone. js, Node.jsand Mongo DB.2015

REFERENCE BOOKS:

1. Full-Stack JavaScript Development by Eric Bush.
2. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
3. Tomasz Dyl ,KamilPrzeorski , MaciejCzarnecki, Mastering Full Stack React Web Development 2017

e-Resources and Digital Material:

1. https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/
2. https://www.w3schools.com/html/
3. https://www.w3schools.com/css/
4. https://www.w3schools.com/js/
5. https://www.w3schools.com/nodejs/
6. https://education.github.com/git-cheat-sheet-education.pdf

COURSE OUTCOMES:

1. Building fast and interactive UIs
2. Applying Declarative approach for developing web apps
3. Understanding ES6 features to embrace modern JavaScript
4. Building reliable APIs with Express. Js
5. Create and manage Git repositories, track changes, and push code to GitHub.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
0	0	2	1

(23A04526) TINKERING LAB

Course Category	**Skill Oriented Course (SC)**
Course Enrichment Relevance	**Skill Development**

COURSE OBJECTIVES:

1) Make your own parallel and series circuits using breadboard for any application of your choice.

2) Design and 3D print a Walking Robot

3) Design and 3D Print a Rocket.

4) Temperature & Humidity Monitoring System (DHT11 + LCD)

5) Water Level Detection and Alert System

6) Automatic Plant Watering System

7) Bluetooth-Based Door Lock System

8) Smart Dustbin Using Ultrasonic Sensor

9) Fire Detection and Alarm System

10) RFID-Based Attendance System

11) Voice-Controlled Devices via Google Assistant

12) Heart Rate Monitoring Using Pulse Sensor

13) Soil Moisture-Based Irrigation

14) Smart Helmet for Accident Detection

15) Milk Adulteration Detection System

16) Water Purification via Activated Carbon

17) Solar Dehydrator for Food Drying

18) Temperature-Controlled Chemical Reactor

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

---

19) Ethanol Mini-Plant Using Biomass

20) Smart Fluid Flow Control (Solenoid + pH Sensor)

21) Portable Water Quality Tester

22) AI Crop Disease Detection

23) AI-based Smart Irrigation

24) ECG Signal Acquisition and Plotting

25) AI-Powered Traffic Flow Prediction

26) Smart Grid Simulation with Load Monitoring

27) Smart Campus Indoor Navigator

28) Weather Station Prototype

29) Firefighting Robot with Sensor Guidance

30) Facial Recognition Dustbin

31) Barcode-Based Lab Inventory System

32) Growth Chamber for Plants

33) Biomedical Waste Alert System

34) Soil Classification with AI

35) Smart Railway Gate

36) Smart Bin Locator via GPS and Load Sensors

37) Algae-Based Water Purifier

38) Contactless Attendance via Face Recognition

Note: A minimum of 8 to 10 experiments must be completed by the students.

e-Resources and Digital Material:

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE OUTCOMES:

1. Identify real-world problems and formulate innovative ideas by applying basic engineering and scientific principles
2. Demonstrate hands-on skills in using tools, components, and prototyping equipment (e.g., Arduino, 3D printer, sensors, mechanical kits).
3. Design and develop simple prototypes to test and validate concepts through iterative experimentation.
4. Collaborate effectively in teams to brainstorm, plan, and execute mini-projects with creative and sustainable solutions.
5. Document and present the tinkering process, prototype functionality, and outcomes with clarity, using appropriate technical and visual communication methods.

SANTHIRAM ENGINEERING COLLEGE

(AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B.Tech. I Sem.

L	T	P	C
-	-	-	2

(23A99507) EVALUATION OF COMMUNITY SERVICE INTERNSHIP

Course Category	**Mandatory Course (credit)**
Course Enrichment Relevance	**Environment & Sustainability**

COURSE OBJECTIVES:

REFERENCE BOOKS:

e-Resources and Digital Material:

COURSE OUTCOMES:

SANTHIRAM
ENGINEERING COLLEGE::NANDYAL
(AUTONOMOUS)

Highlights of the College

- Received Autonomous Status.
- Accredited by NBA for the Departments of ECE and CSE.
- Accredited by NAAC with Grade-A (3.2 score)
- Recognized as Q-Mentor College by APSCHE, for guiding HEIs for accreditation.
- Listed as one of the Best Engineering College with AA+ Grade by Career 360 in the year 2023.
- Recognized in GOLD CATEGORY by AICTE-CII Survey for the years 2017 & 2018 and also in PLATINUM CATEGORY in the year 2020.
- Received TWO University Gold Medals from JNTUA, Ananthapuramu.
- Received NINE Prathibha Awards from the Govt of A.P.
- SIX Patents were granted and SIX patents were approved under AICTE-KAPILA Scheme.
- Received around 50 Lakhs woth of funding projects under various schemes of UGC, AICTE, IEEE, IE and etc.

VISION

To become a nucleus for pursuing technical education and pool industrial research and developmental activities with social-conscious and global standards.

MISION

- To provide Advanced Educational Programs and prepare students to achieve success and take leading roles in their chosen fields of specialization by arising a self-sustained University.
- To establish postgraduate programs in the current and Advanced Technologies.
- To establish an R&D Consultancy through developing Industry Institute Interaction, building up exceptional infrastructure.
- To propel every individual, realize and act for the technical development of the society.

MOTTO

Education for Peace and Progress

website: www.srecnandyal.edu.in

NH-40, NANDYAL-518501(DT), A.P, INDIA.