



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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.
- (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.

(c) Programs offered by the College:

The following programs are offered at present as specializations for the B. Tech. course from 2023-2024.

S. No.	Branch	Program Code
01.	Computer Science & Engineering	01
02.	Electronics and Communication Engineering	02
03.	Mechanical Engineering	03
04.	Electrical and Electronics Engineering	04
05.	Civil Engineering	05

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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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
2 Hrs. Practical (Lab) per week	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 excluding mid-semester Examination and End Examination dates. 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:



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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. The total duration of the B. Tech (Regular) Programme is four academic years.
- ii. Each academic year of study is divided into two semesters.
- iii. The minimum number of instruction days in each semester is 90 days excluding mid-semester Examination and End Examination dates.
- iv. There shall be a mandatory student induction program for freshers, 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 undergraduate 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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 the 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. An undergraduate degree with Honors is introduced by the University for the students having good academic record.
- xvi. Each college 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. Each 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 the 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 the theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- ii) For practical subjects, the distribution shall be 30 marks for the 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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 has both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for 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 paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.
- ii) Objective paper shall contain 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of question. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
 - The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
 - The objective paper shall be conducted by the respective institution on the day of subjective paper test.
 - 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 the average marks shall be considered.
- 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) The 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) Finalized mid marks of first and second mid semesters shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage 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 Marks: $(25 \times 0.8) + (20 \times 0.2) = 24$

If the student is absent for any one midterm examination, the finalized mid semester marks shall be arrived at by considering 80% weightage 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 Marks: $(25 \times 0.8) + (0 \times 0.2) = 20$

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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- iii) There shall be 2 short answer questions from each unit.
- a) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each.
Students shall answer any one of them.
- iv) The questions 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) The question paper shall be in two parts viz., Part A and Part B with equal weightage 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.
Students 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.

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 the 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 a senior expert in the subject from the same 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, 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 weightage of 80% to better mid marks and



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage 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 records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

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 expert in the subject nominated by the principal.
- iv) 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 senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.
- v) The student shall be given an option to choose either the skill courses being offered by the college 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.
- vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.
- vii) 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 University.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

11. Massive Open Online Courses (MOOCs):

A Student must pursue and complete one course compulsorily through MOOCs approved by the University. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course 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 12 weeks) offered through MOOCs with the approval of the 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. The 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 university.

Necessary amendments to the 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 University 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 University shall offer credit mobility for MOOCs and give the equivalent credit weightage 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) The 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 University/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 university shall ensure no overlap of MOOC exams with that of the university examination schedule. In case of delay in results, the university will re-issue the marks sheet for such students.
- viii) Students 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 institution shall submit the following to the examination section of the university:
 - a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.
 - b) Undertaking form filled in by the students for credit transfer.
- x) The universities 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 University from time to time.



13. Academic Bank of Credits (ABC)

The University 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 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 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% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure a minimum of 40% of marks for successful completion. In case a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the University.

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 a project report on the work carried out during the internship.

The project report shall be evaluated by 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 an internal examiner and external examiner appointed by the University and is evaluated for 140 marks.

The college 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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 a 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 4 (Four) 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 the best choice for academically excellent students having a 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 an 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 Principal of the college shall arrange separate class work and timetable of the courses offered under the 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 an 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) 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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

same Department/Discipline

- ii) The enrolment of students 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 7.0 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 are to be completed simultaneously with a Major degree program.

Registration for Honors:

- i) The eligible and interested students shall apply through the Head of the Department (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 offline at the respective institutions.

17. Attendance Requirements:

- i) A student shall be eligible to appear for the University external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects.
 - b) 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.
- ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the University.
- iv) 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.
- v) 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.
- vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii) 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.

- i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per university 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,



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 a case, he/she shall be in the academic regulations into which he/she is readmitted.

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

- 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.
- 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 GradePoint Average (CGPA):

The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points 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.,

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

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.,

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

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:



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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	$\geq 6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

CGPA to Percentage conversion Formula – $(\text{CGPA} - 0.5) \times 10$ **20. With-holding of Results**

If the candidate has any dues not paid to the university 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 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 startups. This period may be extended to two years at the most and these two years would not be counted for the time_{1f3}or



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students to the University. An evaluation committee constituted by the University 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 excluding mid semester examination and End Examination dates.

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. 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. The Universities 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.
- v. 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.



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:
- Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.
 - (i) Registering for Honors is optional.
 - (ii) Honors is 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 applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).



Sri Krishnadevaraya University College of Engineering & Technology
Ananthapuramu-515003(A.P) India
Computer Science and Engineering

SKUCET Curriculum
B. Tech Course Structure – R23
COMPUTER SCIENCE AND ENGINEERING

Semester – 0 Common for All Branches of Engineering				
S.No	Course No	Course Name	Category	L-T-P-C
1		Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2		Career Counselling	MC	2-0-2-0
3		Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4		Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5		Proficiency Modules & Productivity Tools	ES	2-1-2-0
6		Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7		Remedial Training in Foundation Courses	MC	2-1-2-0
8		Human Values & Professional Ethics	MC	3-0-0-0
9		Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10		Concepts of Programming	ES	2-0-2-0



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
I Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Communicative English	BS&H	2-0-0	2
2.		Linear Algebra & Calculus	BS&H	3-0-0	3
3.		Engineering Physics	BS&H	3-0-0	3
4.		Basic Civil & Mechanical Engineering	ES	3-0-0	3
5.		Introduction to Programming	ES	3-0-0	3
6.		Engineering Workshop	BS&H	0-0-3	1.5
7.		Communicative English Lab	BS&H	0-0-2	1
8.		Engineering Physics Lab	ES	0-0-2	1
9		Introduction to programming lab	ES	0-0-3	1.5
10		Health and Wellness, Yoga and Sports	BS&H	0-0-2	0.5
Total					19.5

Category	CREDITS
Engineering Science Courses	8.5
Basic Science and Humanities	11
TOTAL CREDITS	19.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
I Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Chemistry	BS&H	3-0-0	3
2.		Differential Equations and Vector calculus	BS & H	3-0-0	3
3.		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4.		Engineering Graphics	ES	1-0-4	3
5.		Data Structures	PC	3-0-0	3
6.		IT Workshop	ES	0-0-2	1
7.		Electrical & Electronics Engineering Workshop	ES	0-0-3	1.5
8.		Chemistry Lab	BS& H	0-0-2	1
9.		Data Structures Lab	PC	0-0-3	1.5
10.		NCC, NSS, community Service	BS&H	0-0-1	0.5
Total					20.5

Category	CREDITS
Basic Sciences and Humanities course	7.5
Engineering Science Courses	8.5
Professional Core Courses	4.5
TOTAL CREDITS	20.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
II Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Discrete Mathematics & Graph Theory	BS&H	3-0-0	3
2.		Universal Human Values - Understanding Harmony and Ethical human conduct	BS&H	2-1-0	3
3.		Digital Logic and Computer Organization	ES	3-0-0	3
4.		Advanced Data Structures & Algorithms Analysis	PC	3-0-0	3
5.		Object-Oriented Programming Through JAVA	PC	3-0-0	3
6.		Advanced Data Structures and Algorithms Analysis Lab	PC	0-0-3	1.5
7.		Object-Oriented Programming Through JAVA Lab	PC	0-0-3	1.5
8.		Python programming	SOC	0-1-2	2
					20

Category	CREDITS
Engineering Science Courses	3
Professional Core	9
Basic Science and Humanities	6
Skill Course	2
TOTAL CREDITS	20



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
II Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Managerial Economics and Financial Analysis	BS&H	2-0-0	2
2.		Probability & Statistics	BS & H	3-0-0	3
3.		Operating Systems	PC	3-0-0	3
4.		Database Management Systems	PC	3-0-0	3
5.		Software Engineering	PC	3-0-0	3
6.		Operating Systems & Software Engineering Lab	PC	0-0-3	1.5
7.		Database Management Systems Lab	PC	0-0-3	1.5
8.		Full Stack Development-1	SC	0-1-2	2
9.		Design Thinking & Innovation	BS&H	0-1-2	2
10.		Environmental Science	MC	2-0-0	-
Total					21
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation					

Category	CREDITS
Basic Sciences and Humanities course	7
Professional Core Courses	12
Skill Course	2
TOTAL CREDITS	21



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
III Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Computer Networks	PC	3-0-0	3
2.		Formal Language and Automata Theory	PC	3-0-0	3
3.		Artificial Intelligence	PC	3-0-0	3
4.		1.Data Ware Housing and Data Mining 2.Object Oriented Analysis and Design 3.Soft Computing	PE-1	3-0-0	3
5.		1.Principles of Software Engineering 2. Introduction to AI. 3. Web Technologies.	OE-1	3-0-0	3
6.		Computer Networks Lab	PC	0-0-3	1.5
7.		Artificial Intelligence Lab	PC	0-0-3	1.5
8.		Full Stack Development-II	SOC	0-1-2	2
9.		Tinkering Lab	ES	0-0-2	1
10.		Evaluation of Community Service Project	PR	-	2
TOTAL					23

Category	CREDITS
Engineering Science Courses	1
Professional Core	12
Professional Elective	3
Open Elective	3
Internship/Project	2
Skill Oriented Course	2
TOTAL CREDITS	23



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
III Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Big Data Analytics	PC	3-0-0	3
2.		Cloud Computing	PC	3-0-0	3
3.		Machine Learning	PC	3-0-0	3
4.		1. Software Testing Methodologies 2. Internet of things 3. Cyber Security	PE-II	3-0-0	3
5.		1. Cryptography and Network Security 2. Distributed Operating Systems 3. Mobile Adhoc Networks	PE-III	3-0-0	3
6		1. Principles of Database Management Systems. 2. Introduction to Cyber Security. 3. JAVA Programming.	OE-II	3-0-0	3
6.		Big Data Analytics Lab	PC	0-0-3	1.5
7.		Machine Learning Lab	PC	0-0-3	1.5
8.		Soft Skills or IELTS	SOC	0-1-2	2
9.		Technical Paper Writing	AC	2-0-0	0
TOTAL					23
Industrial/Research Internship (Mandatory) for 8 weeks duration during summer vacation					

Category	CREDITS
Professional Core	12
Professional Elective	6
Open Elective	3
Skill Oriented Course	2
Audit Course	0
TOTAL CREDITS	23



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
IV Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Deep Learning	PC	3-0-0	3
2.		1.Human Resource & Project Management 2.E-Business 3.Management Science	MGT	2-0-0	2
3.		1.Software Architecture &Design Patterns 2.Augmented Reality and Virtual Reality 3. Block Chain Technology	PE-IV	3-0-0	3
4.		1.Data Science 2.Quantum Computing 3.Agile Methodologies	PE-V	3-0-0	3
5.		1.Fundamentals of Computer Networks 2.Introduction to Data Science. 3. Introduction to Quantum Computing	OE-III	3-0-0	3
6		1.Fundamentals of Operating Systems. 2. Fundamentals of Cloud Computing. 3. Introduction to Machine Learning.	OE-IV	3-0-0	3
7		Mobile Application development	SOC	0-1-2	2
8		Prompt Engineering	AC	2-0-0	0
9		Evaluation of Summer Internship	PR	-	2
TOTAL					21

Category	CREDITS
Professional Core	3
Professional Elective	6
Open Elective	6
Skill Oriented Course	2
Audit Course	0
Summer Internship	2
TOTAL CREDITS	23



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
IV Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Internship	PR	-	4
2.		Project	PR	-	8
Total					12

Category	CREDITS
Internship	4
Project work	8
TOTAL CREDITS	12



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science					
Honors in CSE					
S.No.	CourseCode	Course Name	Category	L-T-P	Credits
1.		Quantum Computing	PC	3-0-0	3
2.		No SQL Database	PC	3-0-0	3
3.		Randomized Algorithms	PC	3-0-0	3
4.		Algorithm for Intelligent Systems	PC	3-0-0	3
5.		Cloud Security	PC	3-0-0	3
6.		No SQL Lab	PC	0-0-3	1.5
7.		Quantum and Cloud Computing Lab	PC	0-0-3	1.5
Total					18

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science					
Minors in CSE					
S.No.	CourseCode	Course Name	Category	L-T-P	Credits
1.		Data Science for Engineers	PC	3-0-0	3
2.		Introduction To AI/ML	PC	3-0-0	3
3.		Software Engineering	PC	3-0-0	3
4.		Design and Analysis of Algorithms	PC	3-0-0	3
5.		Computer Networks	PC	3-0-0	3
6.		Artificial Intelligence and Machine Learning Laboratory	PC	0-0-3	1.5
7.		Computer Networks Lab	PC	0-0-3	1.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
I Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Communicative English	BS&H	2-0-0	2
2.		Linear Algebra & Calculus	BS&H	3-0-0	3
3.		Engineering Physics	BS&H	3-0-0	3
4.		Basic Civil & Mechanical Engineering	ES	3-0-0	3
5.		Introduction to Programming	ES	3-0-0	3
6.		Engineering Workshop	BS&H	0-0-3	1.5
7.		Communicative English Lab	BS&H	0-0-2	1
8.		Engineering Physics Lab	ES	0-0-2	1
9		Introduction to programming lab	ES	0-0-3	1.5
10		Health and Wellness, Yoga and Sports	BS&H	0-0-2	0.5
Total					19.5

Category	CREDITS
Engineering Science Courses	8.5
Basic Science and Humanities	11
TOTAL CREDITS	19.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)	L	T	P	C
		2	0	0	2
I Year 1st Semester					
Course Objectives:					
The main objective of introducing this course, <i>Communicative English</i> , 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.					
Course Outcomes (CO):					
CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues. CO2: Apply grammatical structures to formulate sentences and correct word forms. CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. CO5: Create a coherent paragraph, essay, and resume.					
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. 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					
UNIT - III					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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: Reading a 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.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Vocabulary: Technical Jargons



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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

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.

Web Resources:**GRAMMAR:**

- www.bbc.co.uk/learningenglish
- <https://dictionary.cambridge.org/grammar/british-grammar/>
- www.eslpod.com/index.html
- <https://www.learngrammar.net/>
- <https://english4today.com/english-grammar-online-with-quizzes/>
- <https://www.talkenglish.com/grammar/grammar.aspx>

VOCABULARY

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	LINEAR ALGEBRA & CALCULUS (Common to All Branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1 st Semester					
Course Objectives:					
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					
Course Outcomes (CO):					
At the end of the course, the student will be able to CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. CO2: Utilize mean value theorems to real life problems. CO3: Familiarize with functions of several variables which is useful in optimization.CO4: Learn important tools of calculus in higher dimensions. CO5: 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.					
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: Solvingsystem 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					
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 functionsof two variables, method of Lagrange multipliers.					
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).					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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)



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ENGINEERING PHYSICS (Common for all branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1 st Semester					
Course Objectives:					
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.					
Course Outcomes (CO):					
CO1: Analyze the intensity variation of light due to polarization, interference, and diffraction.					
CO2: Familiarize with the basics of crystals and their structures.					
CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.					
CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.					
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids.CO6: Identify the type of semiconductor using Hall effect					
UNIT - I	Wave Optics				
Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton’s 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 - Nicol’s 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.					
1. ray diffraction: Bragg’s law - X-ray Diffractometer – crystal structure determination byLaue’s and powder methods					
UNIT - III	Dielectric and 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 dielectric 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.					
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 anddemerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

UNIT - V	Semiconductors
Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – 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.	
Textbooks:	
1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, 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 2021. 2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018. 3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010 4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).	
Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1 st Semester					
Course Objectives:					
• Get familiarized with the scope and importance of Civil Engineering sub-divisions. • Introduce the preliminary concepts of surveying. • Acquire preliminary knowledge on Transportation and its importance in nation's economy. • Get familiarized with the importance of quality, conveyance and storage of water. • Introduction to basic civil engineering materials and construction techniques					
Course Outcomes (CO):					
After the completion of the course students will be able to CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society. CO2: Know the concepts of surveying and to understand the measurement of distances, angles, and levels through surveying. CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation. CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated. CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.					
PART A: BASIC CIVIL ENGINEERING					
UNIT I					
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. Introduction to Prefabricated construction Techniques.					
UNIT II					
Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.					
UNIT - III					
Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering. Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs)					
Textbooks: 1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt.Ltd. Fourth Edition. 2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers.2022. First Edition. 3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING**Course Objectives:**

The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.

Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications

Course Outcomes: On completion of the course, the student should be able to CO1:

Understand the different manufacturing processes.

CO2: Explain the basics of thermal engineering and its applications.

CO3: Describe the working of different mechanical power transmission systems and power plants.

CO4: Describe the 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

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 III

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

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, 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)

Textbooks:

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 MPandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, TataMcGraw Hill publications (India) Pvt. Ltd.
5. Elements of Mechanical Engineering, - Sadhu Singh, S Chand Publications,
6. Elements of Mechanical Engineering - R. K. Rajput, Laxmi Publications as textbooks.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO PROGRAMMING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 1 st Semester					
Course Objectives:					
- To introduce students to the fundamentals of computer programming. - To provide hands-on experience with coding and debugging. - To foster logical thinking and problem-solving skills using programming. - To familiarize students with programming concepts such as data types, control structures, functions, and arrays. - To encourage collaborative learning and teamwork in coding projects.					
Course Outcomes (CO):					
A student after completion of the course will be able to CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. CO2: Analyse a problem and develop an algorithm to solve it. CO3: Implement various algorithms using the C programming language. CO4: Understand more advanced features of C language. CO5: Develop problem-solving skills and the ability to debug and optimize the code					
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, User-defined data types-Structures and Unions.					
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. Scope and Lifetime of Variables, Basics of File Handling					
Note: The syllabus is designed with C Language as the fundamental language of implementation.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988 2. Schaum's 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 Thiraja, Oxford, 2016, 2nd edition 3. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 1st Semester					
Course Objectives:					
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills					
Course Outcomes (CO):					
CO1: Identify workshop tools and their operational capabilities. CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. CO3: Apply fitting operations in various applications. CO4: Apply basic electrical engineering knowledge for House Wiring Practice					
List of Experiments:					
• Demonstration: Safety practices and precautions to be observed in workshop. • 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 • Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets. Tapered tray b) Conical funnel c) Elbow pipe d) Brazing • 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 • Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires • Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns. • Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint. • Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.					
Textbooks:					
• Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015. • A Course in Workshop Technology Vol I. & II, B.S. Raghuvanshi, Dhanpath Rai & Co., 2015 & 2017.					
Reference Books:					
• Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media • Promoters and Publishers, Mumbai. 2007, 14th edition • Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004. • Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)	L	T	P	C
		0	0	2	1
I Year 1st Semester					
Course Objectives:					
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. The students will get trained in basic communication skills and also make them ready to face job interviews					
Course Outcomes (CO):					
CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. CO2: Apply communication skills through various language learning activities. CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. CO5: Create effective Course Objectives					
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. Raman Meenakshi, Sangeeta-Sharma. <i>Technical Communication</i>. Oxford Press. 2018. 2. Taylor Grant: <i>English Conversation Practice</i>, Tata McGraw-Hill Education India, 2016 3. Hewing's, Martin. <i>Cambridge Academic English (B2)</i>. CUP, 2012. 4. J. Sethi & P.V. Dhamija. <i>A Course in Phonetics and Spoken English</i>, (2nd Ed), Kindle, 2013 Web Resources: Spoken English: 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 7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

8. <https://www.youtube.com/c/engvidAdam/featured>
9. <https://www.youtube.com/c/EnglishClass101/featured>
10. <https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists>
11. 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
- https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ENGINEERING PHYSICS LAB (Common to All Branches of Engineering)	L	T	P	C
		0	0	2	1
I Year 1st Semester					
Course Objectives:					
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.					
Course Outcomes (CO):					
The students will be able to CO1: Operate optical instruments like travelling microscope and spectrometer. CO2: Estimate the wavelengths of different colours using diffraction grating. CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance. CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively. CO5: Calculate the band gap of a given semiconductor. CO6: Identify the type of semiconductor using Hall effect.					
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.					
References:					
• A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.					
Web Resources					
• www.vlab.co.in • https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	PROGRAMMING LAB (Common to All Branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 1 st Semester					
Course Objectives:					
The course aims to give students hands – on experience and train them on the concepts of the C- programming language					
Course Outcomes (CO):					
- CO1: Read, understand, and trace the execution of programs written in C language. CO2: Select the right control structure for solving the problem. - CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. - CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C					
List of Experiments:					
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() iv) 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 heron's 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.
- vi)

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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 on 1D array.
- iii) The reverse of a 1D integer array
- iv) Find 2's 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**Lab 10 :** 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 Euler's 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 Euler's method

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.

WEEK 14:**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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to All branches of Engineering)	L	T	P	C
		0	0	1	0.5
I Year 1st Semester					
Course Objectives:					
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					
Course Outcomes (CO):					
After completion of the course the student will be able to CO1: Understand the importance of yoga and sports for Physical fitness and sound health. CO2: Demonstrate an understanding of health-related fitness components. CO3: Compare and contrast various activities that help enhance their health. CO4: Assess current personal fitness levels. CO5: Develop Positive 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: - Organizing health awareness programmes in community - Preparation of health profile - Preparation of chart for balance diet for all age groups 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: - 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 - Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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

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 Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
I Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Chemistry	BS&H	3-0-0	3
2.		Differential Equations and Vector calculus	BS & H	3-0-0	3
3.		Basic Electrical & Electronics Engineering	ES	3-0-0	3
4.		Engineering Graphics	ES	1-0-4	3
5.		Data Structures	PC	3-0-0	3
6.		IT Workshop	ES	0-0-2	1
7.		Electrical & Electronics Engineering Workshop	ES	0-0-3	1.5
8.		Chemistry Lab	BS& H	0-0-2	1
9.		Data Structures Lab	PC	0-0-3	1.5
10.		NCC, NSS, community Service	BS&H	0-0-1	0.5
Total					20.5

Category	CREDITS
Basic Sciences and Humanities course	7.5
Engineering Science Courses	8.5
Professional Core Courses	4.5
TOTAL CREDITS	20.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	CHEMISTRY	L	T	P	C
	(Common to EEE, ECE, CSE, IT & allied branches)	3	0	0	3
I Year 2 nd Semester					
Course Objectives:					
- To familiarize engineering chemistry and its applications - To train the students on the principles and applications of electrochemistry and polymers - To introduce instrumental methods, molecular machines and switches.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: CO1: Compare the materials of construction for battery and electrochemical sensors. CO2: Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers. CO3: Explain the principles of spectrometry, slc in separation of solid and liquid mixtures. CO4: Apply the principle of Band diagrams in the application of conductors and semiconductors. CO5: Summarize the concepts of Instrumental methods.					
UNIT - I	Structure and Bonding Models				
Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2 , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O ₂ and CO, etc. π -molecular orbitals of butadiene and benzene, calculation of bond order.					
UNIT II	Modern Engineering materials				
Semiconductors – Introduction, basic concept, application Super Conductors-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-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).					
UNIT - IV	Polymer Chemistry				



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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.

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. Billmeyer Jr, 3rd Edition



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common for all branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 2nd Semester					
Course Objectives:					
- To enlighten the learners in the concept of differential equations and multivariable calculus. - 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.					
Course Outcomes (CO):					
At the end of the course, the student will be able to					
CO1: Solve the differential equations related to various engineering fields.					
CO2: Identify solution methods for partial differential equations that model physical processes.					
CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.					
CO4: Estimate the work done against a field, circulation and flux using vector calculus.					
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: 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, 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 applications of these theorems.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to All branches of Engineering)	L	T	P	C
		3	0	0	3
I Year 2 nd Semester					
Course Objectives:					
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.					
Course Outcomes (CO):					
After the completion of the course students will be able to CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments. CO2: 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. CO3: 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. CO4: Analyze different electrical circuits, performance of machines and measuring instruments. CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.					
PART A: BASIC ELECTRICAL ENGINEERING					
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.					
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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

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

Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

Web Resources:

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

PART B: BASIC ELECTRONICS ENGINEERING**Course Objectives:**

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

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 INSTRUMENTATION**

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 Adders. Introduction to sequential circuits, Flip flops.

Textbooks:

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.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ENGINEERING GRAPHICS (Common to All branches of Engineering)	L	T	P	C
		1	0	4	3
I Year 2 nd Semester					
Course Objectives:					
- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing - To impart knowledge on the projection of points, lines and plane surfaces - To improve the visualization skills for better understanding of projection of solids - To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces. - To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.					
Course Outcomes (CO):					
CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. CO3: Understand and draw projection of solids in various positions in first quadrant.CO4: Explain principles behind development of surfaces. CO5: Prepare isometric and perspective sections of simple solids.					
UNIT - I					
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involute, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.					
UNIT II					
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 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.					
UNIT - III					
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 another plane, inclined to both the reference planes.					
UNIT - IV					
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: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views. Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformation using Auto CAD (Not for end examination).					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016
2. Engineering Drawing by K.L. Narayana & P. Kannaiah Tata Mcgrawhill Publications as textbook
3. Engineering Drawing - R.K. Dhawan, S Chand Publications

Reference Books:

1. Engineering Drawing - K.R. Gopala Krishna, Subhas publications, as reference books .
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, TataMcGraw Hill, 2017.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DATA STRUCTURES	L	T	P	C
		3	0	0	3
I Year 2nd Semester					
Course Objectives:					
- To provide the knowledge of basic data structures and their implementations. - To understand the importance of data structures in context of writing efficient programs. - To develop skills to apply appropriate data structures in problem solving.					
Course Outcomes (CO):					
At the end of the course, Student will be able to CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues and apply them appropriately to solve data management challenges. CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees. CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.					
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. Dequeues: Introduction to dequeues (double-ended queues), Operations on dequeues and their applications					
UNIT - V	Functions & File Handling				
Graphs: Introduction, Graph Terminology, Directed Graphs, and Representation of Graphs. Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal 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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:
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:
4. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders 5. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft 6. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum 7. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein 8. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	IT WORKSHOP (Common to all branches of Engineering)	L	T	P	C
		0	0	2	1
I Year 2nd Semester					
Course Objectives:					
- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables - To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS - To teach basic command line interface commands on Linux. - To teach the usage of Internet for productivity and self-paced life-long learning - To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.					
Course Outcomes (CO):					
CO1: Perform Hardware troubleshooting. CO2: Understand Hardware components and inter dependencies. CO3: Safeguard computer systems from viruses/worms. CO4: Document/ Presentation preparation. CO5: Perform calculations using spreadsheets.					
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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 TeXand 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.

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?'"



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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 Anfinson 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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	C
		0	0	3	1.5
I Year 1 st Semester					
Course Objectives:					
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations					
Course Outcomes (CO):					
CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. CO2: 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. CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments. CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.					
Activities: 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. 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. 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					
PART A: ELECTRICAL ENGINEERING LAB					
List of experiments: 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					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Reference Books: 1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition 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, ThirdEdition Note: Minimum Six Experiments to be performed.
PART B: ELECTRONICS ENGINEERING LAB
Course Objectives: • To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.
Course Outcomes: At the end of the course, the student will be able to CO1: Identify & testing of various electronic components. CO2: Understand the usage of electronic measuring instruments. CO3: Plot and discuss the characteristics of various electron devices. CO4: Explain the operation of a digital circuit.
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.
References: 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. Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	CHEMISTRY LAB	L	T	P	C
		0	0	2	1
I Year 1 st Semester					
Course Objectives:					
Verify the fundamental concepts with experiments.					
Course Outcomes (CO):					
At the end of the course, the students will be able to CO1: Determine the cell constant and conductance of solutions. CO2: Prepare advanced polymer Bakelite materials. CO3: Measure the strength of an acid present in secondary batteries. CO4: Analyse the IR spectra of some organic compounds. CO5: Calculate strength of acid in Pb-Acid battery					
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					
Reference:					
"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	.DATA STRUCTURES LAB	L	T	P	C
		0	0	3	1.5
I Year 2nd Semester					
Course Objectives:					
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.					
Course Outcomes (CO):					
CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues and apply them appropriately to solve data management challenges.					
List of Experiments:					
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. ii) 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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Exercise8: Binary Search Tree

- i) Implementing a BST using Linked List.
- ii) Traversing of BST.
- iii) Implement Breadth First Search-BFS and Depth First Search-DFS

Exercise 9: Hashing

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

Textbooks:

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

Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms by Robert Sedgewick.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to All branches of Engineering)	L	T	P	C
		0	0	1	0.5
I Year 2nd Semester					
Course Objectives:					
The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service .					
Course Outcomes (CO):					
After completion of the course the students will be able to CO1: Understand the importance of discipline, character and service motto. CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. CO3: Explore human relationships by analyzing social problems. CO4: Determine to extend their help for the fellow beings and downtrodden people. CO5: Develop leadership skills and civic responsibilities					
UNIT I Orientation General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance. Activities: - Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills - Conducting orientations programs for the students –future plans-activities-releasing road map etc. - Displaying success stories-motivational biopics- award winning movies on societal issues etc. - Conducting talent show in singing patriotic songs-paintings- any other contribution. UNIT II Nature & Care Activities: - Best out of waste competition. - Poster and signs making competition to spread environmental awareness. - Recycling and environmental pollution article writing competition. - Organising Zero-waste day. - Digital Environmental awareness activity via various social media platforms. - Virtual demonstration of different eco-friendly approaches for sustainable living. - Write a summary on any book related to environmental issues. UNIT III Community Service Activities: - 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. - Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS, - Conducting consumer Awareness. Explaining various legal provisions etc. - Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education. - Any other programmes in collaboration with local charities, NGOs etc.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and 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, DirectorateGeneral 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.

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 vivavoce on the subject.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
II Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Discrete Mathematics & Graph Theory	BS&H	3-0-0	3
2.		Universal Human Values - Understanding Harmony and Ethical human conduct	BS&H	2-1-0	3
3.		Digital Logic and Computer Organization	ES	3-0-0	3
4.		Advanced Data Structures & Algorithms Analysis	PC	3-0-0	3
5.		Object-Oriented Programming Through JAVA	PC	3-0-0	3
6.		Advanced Data Structures and Algorithms Analysis Lab	PC	0-0-3	1.5
7.		Object-Oriented Programming Through JAVA Lab	PC	0-0-3	1.5
8.		Python programming	SOC	0-1-2	2
					20

Category	CREDITS
Engineering Science Courses	3
Professional Core	9
Basic Science and Humanities	6
Skill Course	2
TOTAL CREDITS	20



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DISCRETE MATHEMATICS & GRAPH THEORY	L	T	P	C
		3	0	0	3
II Year 1 st Semester					
Course Objectives:					
- Gain proficiency in mathematical logic and inference rules in propositional and predicate calculus. - Understand set theory, functions, lattices, and algebraic structures like groups and monoids. - Master combinatorics and recurrence relations, focusing on enumeration and generating functions. - Learn to analyze and apply graph theory concepts, including trees, spanning trees, and Euler circuits.					
Course Outcomes (CO):					
- Construct and evaluate logical expressions while applying inference rules in propositional and predicate logic. - Apply set theory and algebraic structures to solve problems related to functions and group theory. - Perform combinatorial analysis, solve recurrence relations, and utilize generating functions in algorithms. - Analyze graph structures and solve problems involving spanning trees, Euler circuits, and Hamiltonian graphs.					
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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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.	
Textbooks:	
Textbooks: 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:	
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 Online Learning Resources: http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf .	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	L	T	P	C
		2	1	0	3
II Year 1st Semester					
Course Objectives:					
- 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. - 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. - To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.					
Course Outcomes (CO):					
- Define the terms like Natural Acceptance, Happiness and Prosperity - Identify oneself, and one's surroundings (family, society nature) - Apply what they have learnt to their own self in different day-to-day settings in real life - Relate human values with human relationship and human society. - Justify the need for universal human values and harmonious existence - Develop as socially and ecologically responsible engineers					
Course Topics					
The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.					
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 Lecture 4: 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.					
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					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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.		
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 I – Introduction to Value Education PS1 Sharing about Oneself PS2 Exploring Human Consciousness PS3 Exploring Natural Acceptance Practice Sessions for UNIT II – Harmony in the Human Being PS4 Exploring the difference of Needs of self and body PS5 Exploring Sources of Imagination in the self PS6 Exploring Harmony of self with the body Practice Sessions for UNIT III – Harmony in the Family and Society PS7 Exploring the Feeling of Trust PS8 Exploring the Feeling of Respect PS9 Exploring Systems to fulfil Human Goal Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10 Exploring the Four Orders of Nature PS11 Exploring Co-existence in Existence 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		



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbook READINGS:**Textbook and Teachers Manual**

a. The Textbook

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

b. The Teacher's Manual

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. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, 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
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. <https://fdp-si.aicte-india.org/UHV-II%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-II%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-II%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-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DIGITAL LOGIC & COMPUTER ORGANIZATION	L	T	P	C
		3	0	0	3
II Year 1 st Semester					
Course Objectives:					
- Understand data representation, including binary, fixed-point, and floating-point formats. - Learn to design and minimize digital logic circuits, including combinational and sequential circuits. - Study computer arithmetic operations and processor organization concepts. - Explore memory organization and input/output systems in computer architecture.					
Course Outcomes (CO):					
- Perform number conversions and understand various data representation techniques. - Design and simplify logic circuits, including decoders and multiplexers. - Execute arithmetic operations and understand processor instruction execution. - Analyse memory types and manage input/output operations effectively.					
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				



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

UNIT - V	
Input /Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces, Pipelining.	
Textbooks:	
Textbooks: 1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill, 2023. 2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education, 2018.	
Reference Books:	
Reference Books: 1. Computer Systems Architecture, M. Moris Mano, 3rd Edition, Pearson, 2017. 2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004. 3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson, 2003. 4. Computer Organization and Architecture, William Stallings, 11th Edition, Pearson, 2022. Online Learning Resources: https://nptel.ac.in/courses/106/103/106103068/	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS	L	T	P	C
		3	0	0	3
II Year 1st Semester					
Course Objectives:					
- Understand and implement advanced data structures, including AVL trees, B-trees, heaps, and graphs. - Analyze algorithms for time and space complexity using asymptotic notations and explore sorting techniques such as quick sort and merge sort. - Apply greedy methods and dynamic programming to solve optimization problems, including the knapsack problem and shortest path problems. - Explore backtracking and branch-and-bound techniques for problem-solving and understand NP-hard and NP-complete problems, including scheduling issues.					
Course Outcomes (CO):					
- Create and manipulate advanced data structures for efficient data management and retrieval. - Analyze and compare the efficiency of different algorithms and data structures in terms of complexity. - Solve complex problems using greedy algorithms and dynamic programming techniques effectively. - Apply backtracking and branch-and-bound methods to optimization problems and identify NP-hard and NP-complete classifications.					
UNIT - I					
AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, Deletion operations and Applications Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications					
UNIT - II					
Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling					
UNIT - III					
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: 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					



R23 Regulations

Sri Krishnadevaraya University College of Engineering & Technology
Ananthapuramu – 515 003 (A.P) India
Electronics & Communication Engineering

UNIT - V	
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)	
Textbooks:	
1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh 2nd Edition Universities Press 2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran 2nd 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	
Online Learning Resources:	
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)	



Electronics & Communication Engineering

Course Code	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	C
		3	0	0	3
II Year 1 st Semester					
Course Objectives:					
- Understand the fundamental concepts and principles of object-oriented programming using Java. - Learn to create and manipulate classes and objects, including constructors, methods, and access control. - Explore advanced topics such as inheritance, interfaces, and exception handling in Java. - Gain proficiency in Java I/O, multithreading, and database connectivity.					
Course Outcomes (CO):					
- Write and execute Java programs that utilize object-oriented principles effectively. - Create and manage classes, objects, and methods, implementing access control and constructors. - Apply inheritance and interfaces to enhance code reusability and design. - Utilize Java's I/O capabilities, handle exceptions, and implement multithreading for efficient program execution					
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.					
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					

**Electronics & Communication Engineering**

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

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, Overview of Relational Database ,JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set 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)

Textbooks:

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:**References Books:**

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

Online Resources:

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

**Electronics & Communication Engineering**

Course Code	ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB	L	T	P	C
		0	0	3	1.5
II Year 1 st Semester					
Course Objectives:					
- implement operations on advanced data structures, including AVL trees, B-trees, and heap trees. - Perform graph traversals and analyze their applications in algorithms. - Apply sorting techniques and evaluate their performance under different scenarios. - Solve optimization problems using techniques such as dynamic programming, backtracking, and branch-and-bound.					
Course Outcomes (CO):					
- Construct and manipulate AVL trees and B-trees, performing insertion and deletion operations effectively. - Conduct breadth-first and depth-first traversals on graphs, using both adjacency matrix and adjacency list representations. - Implement and compare sorting algorithms, observing their performance in various scenarios. - Solve complex problems, such as the 0/1 knapsack problem and traveling salesperson problem, using appropriate algorithmic strategies.					
List of Experiments:					
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: - 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. - Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations. - Construct Min and Max Heap using arrays, delete any element and display the content of the Heap. - Implement BFT and DFT for given graph, when graph is represented by - Adjacency Matrix - Adjacency Lists - Write a program for finding the bi-connected components in a given graph. - Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases). - Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists. - Implement Job sequencing with deadlines using Greedy strategy. - Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.					



R23 Regulations

Sri Krishnadevaraya University College of Engineering & Technology
Ananthapuramu – 515 003 (A.P) India
Electronics & Communication Engineering

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, Sahni Sartaj, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, 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

Online Learning Resources:

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



Electronics & Communication Engineering

Course Code	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB	L	T	P	C
		0	0	3	1.5

II Year 1st Semester

Course Objectives:

- Understand the fundamentals of Java, including data types, control structures, and object-oriented programming concepts like classes, methods, and inheritance.
- Learn to handle exceptions, manage multithreading, and use interfaces and packages in Java.
- Explore Java's file handling and I/O streams along with GUI development using JavaFX.
- Develop skills in database connectivity using JDBC and building Java applications with graphical interfaces.

Course Outcomes (CO):

- Implement Java programs using fundamental concepts like classes, objects, inheritance, and polymorphism.
- Develop Java applications that handle exceptions, manage threads, and use interfaces effectively.
- Create GUI-based applications using JavaFX, and perform file handling operations with I/O streams.
- Establish database connections in Java using JDBC, and perform basic CRUD operations.

List of Experiments:

Object Oriented Programming fundamentals- data types, control structures

- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

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 $ax^2+bx=0$. 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 String Buffer to delete, remove character.

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 implements 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

1. Write a JAVA program that import and use the user defined packages
2. Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
3. 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

Textbooks:

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.

References Books:

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

Online Resources:

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547_618816347_shared/overview



R23 Regulations

Sri Krishnadevaraya University College of Engineering & Technology
Ananthapuramu – 515 003 (A.P) India
Electronics & Communication Engineering

Course Code	PYTHON PROGRAMMING (Skill Oriented Course)	L	T	P	C
		0	1	2	2
II Year 1 st Semester					
Course Objectives:					
• Introduce core programming concepts of Python programming language. • Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries • Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these					
Course Outcomes (CO):					
• Classify data structures of Python • Apply Python programming concepts to solve a variety of computational problems • 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 • Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas					
List of Experiments:					
UNIT-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: Write a program to find the largest element among three Numbers. 1. Write a Program to display all prime numbers within an interval 2. Write a program to swap two numbers without using a temporary variable. 3. Demonstrate the following Operators in Python with suitable examples. 4. Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators 5. Identity Operators 6. Write a program to add and multiply complex numbers 7. 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.					



Electronics & Communication Engineering

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.

<Sample Experiments:

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, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

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



Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
II Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Managerial Economics and Financial Analysis	BS&H	2-0-0	2
2.		Probability & Statistics	BS & H	3-0-0	3
3.		Operating Systems	PC	3-0-0	3
4.		Database Management Systems	PC	3-0-0	3
5.		Software Engineering	PC	3-0-0	3
6.		Operating Systems & Software Engineering Lab	PC	0-0-3	1.5
7.		Database Management Systems Lab	PC	0-0-3	1.5
8.		Full Stack Development-1	SC	0-1-2	2
9.		Design Thinking & Innovation	BS&H	0-1-2	2
10.		Environmental Science	MC	2-0-0	-
Total					21
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation					

Category	CREDITS
Basic Sciences and Humanities course	7
Professional Core Courses	12
Skill Course	2
TOTAL CREDITS	21



Electronics & Communication Engineering

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
		2	0	0	2

II Year 2nd Semester

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes (CO):

- Define the concepts related to Managerial Economics, financial accounting and management
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques.
- Develop the accounting statements and evaluate the financial performance of business entity.

UNIT - I

Managerial Economics and Demand analysis

Introduction- Nature and Scope of Managerial Economics. Demand-Concept- Demand Function- Law of Demand and its Exceptions. Demand Elasticity- Types of Elasticity – Measurement- Significance of elasticity. Demand Forecasting-Factors governing Forecasting- Methods of Demand Forecasting.

UNIT - II

Production and Cost Analysis

Introduction –Production Function– Short run and long run Production Function- Isoquants and Isocosts, Least-Cost Combination. Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) –Significance of BEA.

UNIT - III

Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition: Features of Perfect Competition-Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT - IV

Capital and Capital Budgeting

Introduction – Capital and its Significance- Types of Capital- Estimating Fixed and Working capital requirements- Sources of Short-term and Long-term Capital. Capital Budgeting– Features of capital budgeting Proposals, Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV) and Internal Rate Return (IRR) Method (sample problems)

UNIT-V Financial Accounting and Analysis

Introduction - Double-Entry Bookkeeping- preparation of Journal- Ledger -Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability Ratios



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage

. Online Learning Resources:

<https://www.slideshare.net/123ps/managerial-economics-ppt>
<https://www.slideshare.net/rossanz/production-and-cost-45827016>
<https://www.slideshare.net/darkyla/business-organizations-19917607>
<https://www.slideshare.net/balarajbl/market-and-classification-of-market>
<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>
<https://www.slideshare.net/ashu1983/financial-accounting>.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	PROBABILITY & STATISTICS	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
- Introduce the fundamental concepts of descriptive statistics, including data collection, measures of central tendency, variability, and correlation analysis. - Explain probability theory, including probability laws, Baye’s theorem, and the behavior of discrete and continuous random variables. - Familiarize students with key probability distributions like binomial, Poisson, and normal distributions, and their applications. - Equip students with statistical tools for hypothesis testing, estimation, and conducting both large and small sample tests.					
Course Outcomes (CO):					
- Apply descriptive statistics to analyze and interpret data, using measures of central tendency, variability, and correlation to draw conclusions. - Solve problems involving probability, including conditional probability and random variables, and compute expectations for various probability distributions. - Analyze and approximate different probability distributions and apply them to real-world data sets. - Conduct hypothesis testing using large and small sample tests, including t-tests, F-tests, and χ^2 tests, to assess the validity of claims based on sample data.					
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					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.	
Textbooks:	
1. Miller and Freund, 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. Online Learning Resources: 1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview 2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
- Understand the basic structure, functions, and operations of operating systems. - Study process management, including process scheduling, inter-process communication, and multithreading models. - Learn synchronization mechanisms, deadlock prevention, and recovery techniques. - Explore memory management strategies and file system implementation, including file access methods and protection mechanisms.					
Course Outcomes (CO):					
- Apply descriptive statistics to analyze and interpret data, using measures of central - Describe the fundamental concepts and operations of operating systems, including system calls and structures. - Analyse process scheduling, thread management, and CPU scheduling algorithms. - Apply synchronization techniques and handle deadlock situations effectively in operating systems. - Demonstrate knowledge of memory management, virtual memory, and file system structures, including access control and protection methods.					
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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and 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.	
Textbooks:	
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. Online Learning Resources: https://nptel.ac.in/courses/106/106/106106144/ http://peterindia.net/OperatingSystems.html	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
- Understand basic concepts of database systems and relational models. - Learn how to design databases and use normalization techniques. - Study how databases handle transactions and concurrency. - Explore NoSQL databases like MongoDB and Cassandra.					
Course Outcomes (CO):					
- Explain the structure and operations of relational databases. - Write SQL queries and perform database operations. - Design and normalize databases for efficiency. - Apply transaction management and understand NoSQL databases.					
UNIT - I					
Introduction, Introduction to Relational Model Introduction: Database systems applications, Database Systems v/s File Systems, view of Data, Data Abstraction , Data Models ,Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database users and Administrators Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.					
UNIT - II					
Introduction to SQL : Overview of the SQL Query Language, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, SQL Join Operations ,Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Views, destroying / altering tables, Procedures, Relational algebra and Relational Calculus: Tuple Relational Calculus, Domain Relational Calculus. Introduction to: B+ trees, Operations on B+ trees					
UNIT - III					
Database Design and the E-R Model, Relational Database Design: Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues. Normalization: Purpose of Normalization or schema refinement ,Concept of functional dependency, Normal forms based on functional dependency lossless join and dependency preserving decomposition, Types of Normal forms: 1NF,2NF,3NF, BCNF,4NF(MVD),5NF					
UNIT - IV					
Transaction Management, Concurrency Control: Transaction Management: Overview Of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of transactions, Performance of Locking, Transaction Support in SQL, Introduction to crash recovery. Concurrency Control : Lock Based Concurrency Control: 2PL, serializability and recoverability, Introduction Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

UNIT - V	
NoSQL: Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, Challenges NoSQL approach. Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra , NoSQL Key/Value databases using MongoDB.	
Textbooks:	
1. A.Silberschatz, H.F.Korth, S.Sudarshan, “Database System Concepts”, 6/e, TMH 2019	
Reference Books:	
1. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA 2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning. 3. Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, TMH	
Web-Resources:	
1. https://nptel.ac.in/courses/106/105/106105175/ 2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3
II Year 2nd Semester					
Course Objectives:					
- Understand the evolution and importance of software engineering. - Explore various software life cycle models and project management techniques. - Learn about software design, coding, and testing methodologies. - Understand software maintenance, quality management, and the role of CASE tools.					
Course Outcomes (CO):					
- Explain different software development models, including waterfall, spiral, and agile. - Apply software project management techniques like COCOMO and risk management. - Design software using structured and function-oriented approaches. - Test and ensure software reliability using both black-box and white-box testing. - Utilize CASE tools and understand the software maintenance process.					
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.					
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.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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.	
Textbooks:	
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:	
Reference Books: 1. Software Engineering, Ian Sommerville, 10th Edition, Pearson. 2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press. e-Resources: 1) https://nptel.ac.in/courses/106/105/106105182/ 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview 3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview	



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	OPERATING SYSTEMS & SOFTWARE ENGINEERING LAB	L	T	P	C
		0	0	3	1.5
II Year 2nd Semester					
Course Objectives:					
• Provide insights into system calls, file systems, semaphores, • Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation • Implement Bankers Algorithms to Avoid the Dead Lock.					
Course Outcomes (CO):					
• Trace different CPU Scheduling algorithms • Implement Bankers Algorithms to Avoid the Dead Lock • Evaluate Page replacement algorithms • Illustrate the file organization techniques • Illustrate Inter process Communication and concurrent execution of threads					
List of Experiments:					
Experiments covering the Topics: • UNIX fundamentals, commands & system calls • CPU Scheduling algorithms, thread processing • IPC, semaphores, monitors, deadlocks • Page replacement algorithms, file allocation strategies • Memory allocation strategies					
Sample Experiments of Operating system: 1. Simulate the following CPU scheduling algorithms a) FCFS b) SJF c) Priority d) Round Robin 2. Control the number of ports opened by the operating system with a) Semaphore b) Monitors. 3. Write a program to illustrate concurrent execution of threads using pthreads library. 4. Write a program to solve producer-consumer problem using Semaphores. 5. Implement the following memory allocation methods for fixed partition a) First fit b) Worst fit c) Best fit 6. Simulate the following page replacement algorithms a) FIFO b) LRU c) LFU 7. Simulate Paging Technique of memory management. 8. Implement Bankers Algorithm for Dead Lock avoidance and prevention					
Sample Experiments of Software Engineering: 1. Draw the Work Breakdown Structure for the system to be automated. 2. Schedule all the activities and sub-activities Using the PERT/CPM charts. 3. Define use cases and represent them in use-case document for all the stakeholders of the system to be automated. 4. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated. 5. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause& Effect Diagram). 6. Define Complete Project plan for the system to be automated using Microsoft Project Tool 7. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document. 8 Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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

Online Learning Resources:

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		0	0	3	1.5
II Year 2nd Semester					
Course Objectives:					
- Populate and query a database using SQL DDL/DML Commands - Declare and enforce integrity constraints on a database - Writing Queries using advanced concepts of SQL - Programming PL/SQL including procedures, functions, cursors and triggers.					
Course Outcomes (CO):					
- Utilize Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment. - Construct and execute queries to manipulate and retrieve data from databases. - Develop application programs using PL/SQL. - Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality. - Establish database connectivity through JDBC (Java Database Connectivity).					
List of Experiments:					
Experiments covering the topics: - DDL, DML, DCL commands - Queries, nested queries, built-in functions, - PL/SQL programming- control structures - Procedures, Functions, Cursors, Triggers, - Database connectivity- ODBC/JDBC Sample Experiments: - Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command. - Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class. - Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views. - 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) - 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) - Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block. Exercise - 5 - Write a JAVA program give example for “super” keyword. - Write a JAVA program to implement Interface. What kind of Inheritance can be achieved? - Write a JAVA program that implements Runtime polymorphism - Develop a program that includes the features NESTED IF, CASE and CASE					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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, RAISE- APPLICATION 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 non- indexing 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/Suggested Reading:

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



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	FULL STACK DEVELOPMENT – 1	L	T	P	C
		0	1	2	2
II Year 1st Semester					
Course Objectives:					
• Make use of HTML elements and their attributes for designing static web pages • Build a web page by applying appropriate CSS styles to HTML elements • Experiment with JavaScript to develop dynamic web pages and validate forms					
Course Outcomes (CO):					
• CO1: Design Websites. • CO2: Apply Styling to web pages. • CO3: Make Web pages interactive. • CO4: Design Forms for applications. • CO5: Choose Control Structure based on the logic to be implemented. • CO6: Understand HTML tags, Attributes and CSS properties •					
List of Experiments:					
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) • 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).					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- 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>, <div>, 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.
- 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.
- e. Write a program using string object properties and methods.
 - f. Write a program using regex object properties and methods.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- 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 a program 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., $1^3 + 5^3 + 3^3 = 153$]
- 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
 - 4. Factorial of that number
 - 5. Fibonacci series up to that number
 - 6. Prime numbers up to that number
 - 7. 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)

Textbooks:

1. Programming the World Wide Web, 7th Edition, Robert 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.

Web Links:

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>
3. <https://www.coursera.org/learn/python?specialization=python#syllabus>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DESIGN THINKING AND INNOVATION	L	T	P	C
		0	1	2	2
II Year 2nd Semester					
Course Objectives:					
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.					
Course Outcomes (CO):					
• Define the concepts related to design thinking. • Explain the fundamentals of Design Thinking and innovation • Apply the design thinking techniques for solving problems in various sectors. • Analyse to work in a multidisciplinary environment • Evaluate the value of creativity • Formulate specific problem statements of real time issues					
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.					
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.					
Textbooks: 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					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

Online Learning Resources:

<https://nptel.ac.in/courses/110/106/110106124/>

<https://nptel.ac.in/courses/109/104/109104109/>

https://swayam.gov.in/nd1_noc19_mg60/previ



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0
II Year 2nd Semester					
Course Objectives:					
- To make the students to get awareness on environment. - 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 - To save earth from the inventions by the engineers.					
Course Outcomes (CO):					
- Analyze various energy sources and their environmental impacts. - Understand ecosystem functions and propose biodiversity conservation strategies. - Identify causes of pollution and recommend control measures. - Evaluate climate change impacts and suggest mitigation strategies. - Apply environmental management systems and sustainability practices.					
UNIT - I					
NATURAL RESOURCES:					
Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources, non-conventional energy sources; Implications of energy use on the environment.					
Forest resources – Use and over – exploitation, deforestation, Water resources – Use and over utilization of surface and ground water– Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources					
Introduction to sustainable development: Sustainable Development Goals (SDGs) - targets and indicators, challenges and strategies for SDGs.					
UNIT - II					
ECOSYSTEMS: Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Ecological succession. Introduction, types, characteristic features, structure and function of Forest, Grassland, Desert and aquatic ecosystems.					
BIODIVERSITY AND ITS CONSERVATION: 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-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts					
UNIT - III					
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions.					
SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution.					
UNIT - IV					
Climate Change: Impacts, Adaptation and Mitigation:					
Understanding climate change: Natural variations in climate; Structure of atmosphere; Anthropogenic climate change from greenhouse gas emissions – past, present and future; Projections of global climate change					
Impacts, vulnerability and adaptation to climate change. Observed impacts of climate change on ocean and land systems.					
Mitigation of climate change: Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; Energy efficiency measures; Renewable energy sources; Carbon capture and storage.					
UNIT-V					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Environmental Management

Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.

Environmental management system: ISO 14001, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis, Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme.

TEXTBOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by PalaniSwamy – Pearson education
3. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

REFERENCES:

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	Computer Science and Engineering COMMUNITY SERVICE PROJECT Experiential learning through community engagement				
II Year 2nd Semester					
INTRODUCTION					
- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development. - Community Service Project involves students in community development and service activities and applies the experience to personal and academic development. - Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.					
OBJECTIVE					
Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are; - To sensitize the students to the living conditions of the people who are around them, - To help students to realize the stark realities of society. - To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability - To make students aware of their inner strength and help them to find new /out of box solutions to social problems. - To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections. - To help students to initiate developmental activities in the community in coordination with public and government authorities. - To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.					
Implementation of Community Service Project					
- Every student should put in 6 weeks for the Community Service Project during the summer vacation. - Each class/section should be assigned with a mentor. - Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc - A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded. - The logbook has to be countersigned by the concerned mentor/faculty in charge. - An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member. - The final evaluation to be reflected in the grade memo of the student.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
 - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water

EXPECTED OUTCOMES
BENEFITS OF COMMUNITY SERVICE PROJECT TO
STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Flourey culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
 7. Awareness Program on Socially relevant themes.
- Programs for Women Empowerment
1. Government Guidelines and Policy Guidelines
 2. Women's Rights
 3. Domestic Violence
 4. Prevention and Control of Cancer
 5. Promotion of Social Entrepreneurship
- General Camps
1. General Medical camps
 2. Eye Camps
 3. Dental Camps
 4. Importance of protected drinking water
 5. ODF awareness camp
 6. Swatch Bharath
 7. AIDS awareness camp
 8. Anti Plastic Awareness
 9. Programs on Environment
 10. Health and Hygiene
 11. Hand wash programmes
 12. Commemoration and Celebration of important days
- Programs for Youth Empowerment
1. Leadership
 2. Anti-alcoholism and Drug addiction
 3. Anti-tobacco
 4. Awareness on Competitive Examinations
 5. Personality Development
- Common Programs
1. Awareness on RTI
 2. Health intervention programmes
 3. Yoga
 4. Tree plantation
 5. Programs in consonance with the Govt. Departments like –
 - i. Agriculture
 - ii. Health
 - iii. Marketing and Cooperation
 - iv. Animal Husbandry
 - v. Horticulture
 - vi. Fisheries
 - vii. Sericulture
 - viii. Revenue and Survey
 - ix. Natural Disaster Management
 - x. Irrigation
 - xi. Law & Order
 - xii. Excise and Prohibition

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project

Activity Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology Dept. of Computer Science and Engineering III Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Computer Networks	PC	3-0-0	3
2.		Formal Language and Automata Theory	PC	3-0-0	3
3.		Artificial Intelligence	PC	3-0-0	3
4.		1.Data Ware Housing and Data Mining 2.Object Oriented Analysis and Design 3.Soft Computing	PE-1	3-0-0	3
5.		1.Principles of Software Engineering 2.Introduction to AI. 3. Web Technologies.	OE-1	3-0-0	3
6.		Computer Networks Lab	PC	0-0-3	1.5
7.		Artificial Intelligence Lab	PC	0-0-3	1.5
8.		Full Stack Development-II	SOC	0-1-2	2
9.		Tinkering Lab	ES	0-0-2	1
10.		Evaluation of Community Service Project	PR	-	2
TOTAL					23

Category	CREDITS
Engineering Science Courses	1
Professional Core	12
Professional Elective	3
Open Elective	3
Internship/Project	2
Skill Oriented Course	2
TOTAL CREDITS	23



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
The course is designed to					
- Identify the components, architecture, and functionalities of computer networks. - Analyze layered network models and communication protocols. - Apply error detection, correction, and data link protocols in networking scenarios. - Evaluate routing strategies, congestion control techniques, and transport protocols such as TCP and UDP. - Design basic Internet-based applications, including web, e-mail, DNS, and multimedia services					
Course Outcomes (CO):					
- Identify hardware and software components of a computer network and their roles. - Apply data link layer protocols for error detection, correction, and reliable communication. - Analyze routing algorithms, congestion control strategies, and network layer operations. - Evaluate transport protocols such as TCP and UDP for different application requirements. - Demonstrate the design and implementation of Internet-based services including HTTP, DNS, e-mail, and multimedia applications. - Assess the performance and efficiency of network protocols and layered architectures in real-world scenarios.					
UNIT - I	Computer Networks and the Internet				
What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks (Text book 2), Reference Models, Example Networks, Guided Transmission Media, Wireless Transmission (Text book 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 (Text book 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 Request(Text book 2).					
UNIT - III	The Network Layer				
Routing Algorithms, Internetworking, The Network Layer in The Internet (Text book 1)					
UNIT - IV	The Transport Layer				
Connection less Transport: UDP (Text book 2), The Internet Transport Protocols: TCP, Congestion Control(Text book 1)					
UNIT - V	Principles of Network Applications				
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 (Text book 2)					
Textbooks:					
1.Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson. 2.James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2019.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Reference Books:
1. Forouzan, Data communications and Networking, 5 th Edition, McGraw Hill Publication. 2. Youlu Zheng, Shakil Akthar, “Networks for Computer Scientists and Engineers”, Oxford Publishers, 2016.
Online Learning Resources: https://nptel.ac.in/courses/106105183/25 http://www.nptelvideos.in/2012/11/computer-networks.html https://nptel.ac.in/courses/106105183/3



Sri Krishnadevaraya University

College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India

Computer Science and Engineering

Course Code	FORMAL LANGUAGE AND AUTOMATA THEORY		L	T	P	C
			3	0	0	3
III Year I Semester						
Course Objectives:						
This course is designed to enable students to: - Understand formal languages, grammars, and computational models. - Apply context-free grammars for language generation and parsing. - Use Turing machines to model and solve computational problems. - Analyze decidability and undecidability concepts, including NP-Hard problems.						
Course Outcomes (CO):						
After completion of the course, students will be able to: - List and classify different types of Turing machines. - Design Turing machines for specific computational tasks. - Formulate problems in terms of decidability and undecidability. - Evaluate computational problems to determine solvability and complexity.						
UNIT - I	Finite Automata					
Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automata, Transition Systems, Acceptance of a String by a Finite Automaton, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.						
UNIT - II	Regular Expressions					
Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.						
UNIT - III	Context Free Grammars					
Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context-Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.						
UNIT - IV	Pushdown Automata					
Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.						
UNIT - V	Turing Machine					
Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine. Decidable and Undecidable Problems: NP, NP-Hard and NP-Complete Problems.						
Textbooks:						



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.

Reference Books:

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

Online Learning Resources:

<https://nptel.ac.in/courses/106106049/>
<https://nptel.ac.in/courses/106104028>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ARTIFICIAL INTELLIGENCE				L	T	P	C
					3	0	0	3
III Year I Semester								
Course Objectives:								
This course is designed to enable students to:								
• Introduce the fundamentals of Artificial Intelligence and its foundations. • Teach the principles of machine learning and intelligent environments. • Present searching techniques for effective problem solving. • Introduce Natural Language Processing, perception, and robotics.								
Course Outcomes (CO):								
After completion of the course, students will be able to:								
• Apply searching techniques to solve real-world problems. • Design intelligent agents for various applications. • Develop natural language interfaces for machines. • Construct simple robotic systems with perception and planning. • Summarize the evolution, current trends, and future directions of Artificial Intelligence.								
UNIT - I		Introduction						
Introduction: What is AI, Foundations of AI, History of AI, The State of Art.								
Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.								
UNIT - II		Solving Problems by searching						
Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.								
UNIT - III		Reinforcement Learning & Natural Language Processing						
Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL								
Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.								
UNIT - IV		Natural Language for Communication						
Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition								
Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.								
UNIT - V		Robotics						
Robotics: Introduction, Robot Hardware, Robotic Perception, planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains								
Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.								
Textbooks:								
1. Stuart J. Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3 rd Edition, Pearson Education, 2019.								
Reference Books:								



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DATA WAREHOUSING AND DATA MINING (Professional Electiv- I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
This course is designed to: - Understand Data Warehousing Concepts - Objectives include learning various data preprocessing techniques such as data cleaning, data integration, data transformation, data reduction and data discretization. - Understand the Knowledge Discovery in Databases (KDD) Process. - Develop Practical Skills with Tools and Algorithms.					
Course Outcomes (CO):					
Upon successful completion of this course, students will be able to: Design and implement data warehouse schemas and architectures for organizational data storage and analysis. Apply appropriate data preprocessing techniques to prepare data for mining and analytics. Perform data mining operations such as association rule mining, classification, and clustering on diverse datasets. Select and justify suitable data mining algorithms for specific applications and interpret the obtained results. Evaluate ethical considerations, limitations, and challenges associated with data warehousing and mining practices.					
UNIT - I	Introduction				
Introduction to Data Mining – Data Mining Functionalities – Classification of Data Mining Systems – Data Mining Task Primitives.					
Data Warehouse and OLAP Technology: Data Warehouse, Multidimensional Data Model, From Tables and Spreadsheets to Data Cubes, Star, Snowflake, and Fact Constellation Schemas for Multidimensional Databases, Measures – Categorization and Computation, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model, Data Warehouse Architecture.					
UNIT - II	Data Preprocessing				
Why Preprocess the Data; Descriptive Data Summarization – Measuring the Central Tendency, Measuring the Dispersion of Data, Graphic Displays of Basic Descriptive Data Summaries.					
Data Cleaning: Handling Missing Values, Noisy Data, Data Cleaning as a Process. Data Integration and Transformation: Data Integration, Data Transformation. Data Reduction: Data Cube Aggregation, Attribute Subset Selection, Dimensionality Reduction, Numerosity Reduction.					
UNIT - III	Mining Frequent Patterns, Associations, and Correlations				
Basic Concepts; Efficient and Scalable Frequent Itemset Mining Methods – The Apriori Algorithm, Generating Association Rules from Frequent Itemsets, Improving Efficiency of Apriori, Mining Frequent Itemsets Without Candidate Generation.					
Mining Various Kinds of Association Rules: Mining Multilevel and Multidimensional Association Rules.					
From Association Mining to Correlation Analysis: Strong Rules Are Not Necessarily Interesting, From Association Analysis to Correlation Analysis.					
UNIT - IV	Classification – I				



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Overview of Classification and Prediction – What is Classification? What is Prediction? Issues Regarding Classification and Prediction – Preparing Data for Classification and Prediction, Comparing Classification and Prediction Methods

Bayesian Classification: Bayes' Theorem, Naïve Bayesian Classification. **Classification by Decision Tree Induction:** Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction

Rule-Based Classification: Using IF–THEN Rules for Classification, Rule Extraction from Decision Tree, Rule Induction Using a Sequential Covering Algorithm.

Classification by Backpropagation: A Multilayer Feed-Forward Neural Network, Defining Network Topology, Backpropagation Algorithm.

UNIT - V**Classification – II and Prediction; Cluster Analysis**

Classification and Prediction: Support Vector Machines – Linearly Separable and Inseparable Data, Lazy Learners – K-Nearest Neighbour Classifiers, Case-Based Reasoning. **Prediction:** Linear Regression, Nonlinear Regression, Accuracy and Error Measures – Classifier Accuracy Measures, Predictor Error Measures, Evaluating Accuracy Using Holdout Method, Random Subsampling, Cross Validation, and Bootstrap Methods.

Cluster Analysis: Overview of Cluster Analysis, Types of Data in Cluster Analysis – Interval-Scaled, Binary, Categorical, Ordinal, and Ratio-Scaled Variables, Mixed-Type Variables. Categorization of Major Clustering Methods – Partitioning Methods (K-Means, K-Medoids, CLARANS), Hierarchical Methods (Agglomerative and Divisive, BIRCH, ROCK), Density-Based Methods (DBSCAN), Grid-Based Methods (STING), Model-Based Clustering (Expectation-Maximization).

Textbooks:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India, Second Edition.

Reference Books:

1. Data Mining Introductory and Advanced Topics–Margaret H Dunham, Pearson Education
2. Data Mining Techniques – Arun K Pujari, University Press.
3. Data Warehousing in The Real World – Sam Anahory & Dennis Murray. Pearson Edn Asia.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition
5. The Data Warehouse Life Cycle Tool Kit – Ralph Kimball Wiley Student Edition



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
	(Professional Elective – I)	3	0	0	3
III Year I Semester					
Course Objectives:					
This course is designed to enable students to: - Understand the fundamentals of object-oriented modeling and the role of UML in software development. - Learn basic and advanced structural modeling concepts including classes, relationships, and packages. - Illustrate behavioral modeling through use cases, interaction diagrams, and state machines. - Apply architectural modeling concepts using component and deployment diagrams with real-world case studies.					
Course Outcomes (CO):					
- After completion of the course, students will be able to: - Explain the importance of UML and principles of object-oriented modeling. - Construct class, object, and package diagrams for given problem scenarios. - Develop behavioral models such as use case, activity, interaction, and state chart diagrams. - Design architectural models using component and deployment diagrams. - Apply OOAD concepts to case studies such as Library and ATM systems.					
UNIT - I	Introduction to UML				
Introduction to UML: Importance of modeling, principles of modeling, object-oriented modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.					
UNIT - II	Basic and Advanced Structural Modeling				
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.					
UNIT - III	Class & Object Diagrams				
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Basic Behavioral Modeling-: Interactions, Interaction diagrams. Use cases, Use case Diagrams, Activity Diagrams.					
UNIT - IV	Advanced Behavioral Modeling				
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.					
UNIT - V	Architectural Modeling				
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application, ATM application.					
Textbooks:					
1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.					
Reference Books					
1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education. 2. Pascal Roques: Modeling Software Systems Using UML2, WILEY Dreamtech India Pvt. Ltd. 3. AtulKahate: Object Oriented Analysis & Design, The McGraw – Hill Companies. 4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGraw Hill 5. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	SOFT COMPUTING (Professional Elective Course– I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
This course aims to: • Introduce the fundamental principles and methodologies of soft computing and distinguish them from conventional computing techniques. • Develop an understanding of fuzzy logic systems and heuristic approaches inspired by human reasoning. • Enable students to model and analyze systems using neuro-fuzzy techniques, classification, and clustering methods. • Impart knowledge of genetic algorithms and rough set theory for solving complex optimization and decision-making problems.					
Course Outcomes (CO):					
Upon successful completion of the course, students will be able to: • Differentiate conventional artificial intelligence from computational intelligence approaches. • Apply fuzzy logic concepts to handle uncertainty and imprecision in engineering applications. • Implement classification and clustering algorithms for modeling and data analysis. • Analyze advanced neural network and neuro-fuzzy models for intelligent system design. • Utilize genetic algorithms and rough set theory for optimization and knowledge discovery. • Integrate various soft computing techniques to develop adaptive and intelligent solutions for real-world problems.					
UNIT - I	Introduction to Soft Computing				
Introduction to Soft Computing: Evolutionary Computing – Soft Computing versus Hard Computing – Soft Computing Methods – Recent Trends in Soft Computing – Characteristics of Soft Computing – Applications of Soft Computing Techniques.					
UNIT - II	Introduction to Fuzzy Systems				
Fuzzy Systems: Fuzzy Sets – Fuzzy Relations – Fuzzy Logic – Fuzzy Rule-Based Systems.					
UNIT - III	Fuzzy Decision Making and Particle Swarm Optimization				
Fuzzy Decision Making – Particle Swarm Optimization.					
UNIT - IV	Genetic Algorithms				
Genetic Algorithms: Basic Concepts – Operators for Genetic Algorithms – Crossover and Mutation Properties – Genetic Algorithm Cycle – Fitness Function – Applications of Genetic Algorithms.					
UNIT - V	Rough Sets				
Rough Sets – Rule Induction and Discernibility Matrix – Integration of Soft Computing Techniques					
Textbooks:					
1. B. K. Tripathy and J. Anuradha, <i>Soft Computing – Advances and Applications</i> , Cengage Learning, 2015.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. S. N. Sivanandam and S. N. Deepa, *Principles of Soft Computing*, 2nd Edition, Wiley India, 2008.
2. David E. Goldberg, *Genetic Algorithms: In Search, Optimization and Machine Learning*, Pearson Education.
3. J. S. R. Jang, C. T. Sun, and E. Mizutani, *Neuro-Fuzzy and Soft Computing*, Pearson Education, 2004.
4. G. J. Klir and B. Yuan, *Fuzzy Sets and Fuzzy Logic*, PHI, 1995.
5. Melanie Mitchell, *An Introduction to Genetic Algorithms*, PHI, 1998



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	PRINCIPLES OF SOFTWARE ENGINEERING (Open Elective Course – I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
This course is designed to: - Learn the basic concepts of software engineering and software life cycle models. - Explore issues in software requirements specification and enable students to write SRS documents for software development problems. - Elucidate the basic concepts of software design and enable students to carry out procedural and object-oriented design of software projects. - Understand the basic concepts of black-box and white-box software testing and enable students to design test cases for unit, integration, and system testing. - Introduce the fundamental concepts of software project management.					
Course Outcomes (CO):					
After completion of the course, students will be able to: - Recognize the basic issues in commercial software development. - Summarize software life cycle models. - Identify issues in software requirements analysis and specification. - Apply coding best practices. - Understand concepts and techniques in software testing and quality management.					
UNIT - I	Introduction to Software Engineering				
Introduction to Software Engineering, the evolving role of software, changing nature of software, software myths, software engineering as a layered technology, process framework, Capability Maturity Model Integration (CMMI), process patterns, process assessment, personal and team process models.					
UNIT - II	Process Models and Software Requirements				
Process models: waterfall, incremental, evolutionary, unified process. Software requirements: functional and non-functional requirements, user requirements, system requirements, interface specification, software requirements document.					
UNIT - III	Requirements Engineering Process				
Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. System models: context models, behavioral models, data models, object models.					
UNIT - IV	Design Engineering				
Design process and quality, design concepts, the design model. Creating architectural design: software architecture, data design, architectural styles and patterns. Performing user interface design: golden rules, user interface analysis and design, interface analysis, interface design steps, design evaluation.					
UNIT - V	Testing Strategies and Quality Management				
Testing strategies: strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, debugging techniques. Metrics for process and products: software quality, software measurement, software quality metrics. Quality management: quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, ISO 9000 quality standards					
Textbooks:					
- Roger S. Pressman, <i>Software Engineering: A Practitioner's Approach</i>, 6th edition, McGraw-Hill International Edition. - Ian Sommerville, <i>Software Engineering</i>, 7th edition, Pearson Education.					
Reference Books:					
- K.K. Agarwal & Yogesh Singh, <i>Software Engineering</i>, New Age International Publishers. - James F. Peters, Witold Pedrycz, <i>Software Engineering: An Engineering Approach</i>, Wiley. - Shely Cashman Rosenblatt, <i>Systems Analysis and Design</i>, Thomson Publications. - Waman S. Jawadekar, <i>Software Engineering Principles and Practice</i>, McGraw-Hill.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO AI (Open Elective Course – I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
This course is designed to: • Introduce Artificial Intelligence concepts. • Teach about the machine learning environment. • Present searching techniques for problem solving. • Introduce Natural Language Processing and Robotics.					
Course Outcomes (CO):					
After completion of the course, students will be able to: • Apply searching techniques to solve problems. • Design intelligent agents. • Develop natural language interfaces for machines. • Design mini-robots for practical applications. • Summarize the evolution and future trends of Artificial Intelligence.					
UNIT - I	Introduction				
Introduction to AI, foundations of AI, history of AI, state of the art. Intelligent agents: agents and environments, good behavior, concept of rationality, nature of environments, structure of agents.					
UNIT - II	Solving Problems by Searching				
Problem-solving agents, example problems, searching for solutions, uninformed search strategies, informed search strategies, heuristic functions, local search algorithms and optimization problems, local search in continuous spaces, searching with nondeterministic actions, searching with partial observations, online search agents, unknown environments.					
UNIT - III	Reinforcement Learning & Natural Language Processing				
Reinforcement learning: introduction, passive and active reinforcement learning, generalization in reinforcement learning, policy search, applications of RL. Natural Language Processing: language models, text classification, information retrieval, information extraction.					
UNIT - IV	Natural Language for Communication				
Phrase structure grammars, syntactic analysis, augmented grammars and semantic interpretation, machine translation, speech recognition. Perception: image formation, early image processing, object recognition by appearance, reconstructing the 3D world, object recognition from structural information, vision applications.					
UNIT - V	Robotics				
Introduction to robotics, robot hardware, robotic perception, planning to move, planning uncertain movements, robotic software architectures, application domains. Philosophical foundations: weak AI, strong AI, ethics and risks of AI, agent components, agent architectures, considerations for AI success.					
Textbooks:					
1. Stuart J. Russell, Peter Norvig, <i>Artificial Intelligence: A Modern Approach</i> , 3rd Edition, Pearson, 2019.					
Reference Books:					
1. Nils J. Nilsson, <i>Artificial Intelligence: A New Synthesis</i> , Morgan Kaufmann, 1998. 2. Benny G. Johnson, Fred Phillips, Linda G. Chase, "An Intelligent Tutoring System for the Accounting Cycle: Enhancing Textbook Homework with AI", <i>Journal of Accounting Education</i> , 27.1 (2009): 30–39.					
Online Learning Resources					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- <http://peterindia.net/Allinks.html>
- <http://nptel.ac.in/courses/106106139/>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	WEB TECHNOLOGIES (Open Elective Course – I)	L	T	P	C
		3	0	0	3
III Year I Semester					
Course Objectives:					
This course is designed to enable students to: • Understand the fundamental principles of Web Technologies. • Learn the installation and configuration of Web Servers and PHP environments. • Familiarize with client-server interactions, HTTP protocols, and server-side scripting. • Understand database integration and dynamic content generation using PHP.					
Course Outcomes (CO):					
Upon successful completion of this course, students will be able to: • Describe the fundamentals of Web Technologies and server-side programming. • Create instances of classes using constructors and manage object-oriented concepts. • Familiarize with HTTP servers, request-response handling, and session management. • Understand basic database concepts and implement CRUD operations using PHP and MySQL.					
UNIT - I	Introduction to Web Technologies				
Introduction to Web servers such as Apache 1.1, IIS, XAMPP (Bundle Server), WAMP (Bundle Server); handling HTTP requests and responses; installation and configuration of servers; Introduction to PHP, problems with other technologies (Servlets and JSP), downloading, installing, configuring PHP; programming in a web environment; anatomy of a PHP page.					
UNIT - II	Overview of PHP Data Types and Concepts				
Variables and data types, operators, expressions, statements, strings, arrays, and functions; classes, objects, and interfaces including creating instances using constructors, controlling access to class members, extending classes, abstract classes and methods, using interfaces, and class destructors; file handling and exception management.					
UNIT - III	PHP Advanced Concepts				
Using cookies, HTTP headers, and sessions; authenticating users; working with environment and configuration variables; working with date and time including getting the day and week of the year, determining leap years, file times and dates, setting time zones and GMT/UTC.					
UNIT - IV	Creating and Using Forms				
Understanding common form issues; GET vs. POST methods; validating form input; working with multiple forms; preventing multiple submissions of a form.					
UNIT - V	PHP and Database Access				
Basic database concepts; connecting to a MySQL database; retrieving, displaying, modifying, updating, and deleting data; MVC architecture; PHP and other web technologies including PHP with XML, PHP with AJAX.					
Textbooks:					
1. Jason Gilmore, <i>Beginning PHP and MySQL</i>, 3rd Edition, Apress Publications (Dreamtech). 2. Lee Babin, Nathan A. Good, Frank M. Kromann, Jon Stephens, <i>PHP 5 Recipes: A Problem-Solution Approach</i>.					
Reference Books:					
1. J. Lee and B. Ware, <i>Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP</i>, Addison Wesley (Pearson Education). 2. Julie Meloni and Matt Telles, <i>PHP 6 Fast and Easy Web Development</i>, Cengage Learning Publications. 3. I. Bayross and S. Shah, <i>PHP 5.1</i>, The X Team, SPD. 4. E. Quigley, <i>PHP and MySQL by Example</i>, Prentice Hall (Pearson).					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	3	1.5
III Year I Semester					
Course Objectives:					
• To understand the different types of networks • To discuss the software and hardware components of a network • To enlighten the working of networking commands supported by operating system • To impart knowledge of Network simulator 2/3 • To familiarize the use of networking functionality supported by JAVA • To familiarize with computer networking tools.					
Course Outcomes (CO):					
After completion of the course, students will be able to • Apply the existing algorithms for error and flow control • Experiment with the Network simulation environment • Experiment with socket programming • Develop various applications using socket programming • Design the necessary Security and Authentication algorithms					
List of Experiments:					
1. Implementation of a program for CRC and Hamming code for Error Handling. 2. Implementation of a program for Remote command execution (Two M/C's maybe used) 3. Implementation of an authentication algorithm to access a file. 4. Implement a Chatting application using JAVA TCP and UDP sockets. 5. Implementation of a Socket program for Echo/Ping/Talk commands. 6. Creation of a Socket between two Computers and Enable File Transfer between them using a) TCP b) UDP 7. Create a Socket using HTTP for Web Page Upload & Download. 8. Using Wireshark perform the following operations: 1. Inspect HTTP Traffic 2. Inspect HTTP Traffic from a Given IP Address, 3. Inspect HTTP Traffic to a Given IP Address, 4. Reject Packets to Given IP Address, 5. Monitor Apache and MySQL Network Traffic. 9. Use CISCO Packet tracer software to build network topology and configure using Distance vector routing protocol. 10. Use CISCO Packet tracer software to build network topology and configure using Link State routing protocol. 11. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss. 12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss. 13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.					
References:					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. ShivendraS.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, “TCP/IP Essentials:A Lab-Based Approach”, Cambridge University Press, 2004.
2. Cisco Networking Academy, “CCNA1 and CCNA2 Companion Guide”, Cisco Networking Academy Program, 3rd edition, 2003.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
		0	0	3	1.5
III Year I Semester					
Course Objectives:					
- To teach the methods of implementing algorithms using artificial intelligence techniques - To illustrate search algorithms - To demonstrate the building of intelligent agents					
Course Outcomes (CO):					
After completion of the course, students will be able to - Implement search algorithms - Solve Artificial intelligence problems - Design chatbot and virtual assistant					
List of Experiments:					
- Write a program to implement DFS and BFS - Write a Program to find the solution for traveling salesman Problem - Write a program to implement Simulated Annealing Algorithm - Write a program to find the solution for the wumpus world problem - Write a program to implement 8 puzzle problem - Write a program to implement Towers of Hanoi problem - Write a program to implement A* Algorithm - Write a program to implement Hill Climbing Algorithm - Build a Chatbot using AWS Lex, Pandora bots. - Build a bot that provides all the information related to your college. - Build a virtual assistant for Wikipedia using Wolfram Alpha and Python - The following is a function that counts the number of times a string occurs in another string: # Count the number of times string s1 is found in string s2 defcountsubstring(s1,s2): count = 0 for i in range(0,len(s2)-len(s1)+1): if s1 == s2[i:i+len(s1)]: count += 1 return count For instance, countsubstring('ab','cabalaba') returns 2. Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character). - Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count (lambda x: x>2, [1, 2, 3, 4, 5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function. - Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 5 and a random value in the range 1. 10.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should perform at least 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of $2:5 \times N$ for each value problem size N . Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of $1 \times N$ and with $4:0 \times N$.

15. Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitely large).

Write a function layout (N, C, L) that can give a table placement (i.e. a number from $0 : : C - 1$) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number $0 \dots N-1$ for each guest and that the list of restrictions is of the form $[(X, Y) \dots]$ denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

References:

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
4. Artificial Neural Networks, B. Yagna Narayana, PHI
5. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight, TMH.
6. Artificial Intelligence and Expert Systems, Patterson, PHI.

Online Learning Resources/Virtual Labs:

<https://www.tensorflow.org/>
<https://pytorch.org/> <https://github.com/pytorch>
<https://keras.io/> <https://github.com/keras-team>
<http://deeplearning.net/software/theano/>
<https://github.com/Theano/Theano>
<https://caffe2.ai/> <https://github.com/caffe2>
<https://deeplearning4j.org/Scikit-learn>:<https://scikit-learn.org/stable/>
<https://github.com/scikit-learn/scikit-learn> <https://www.deeplearning.ai/>
<https://opencv.org/>
<https://github.com/qpwweee/keras-yolo3>
<https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/>
<https://developer.nvidia.com/cuda-math-library>
http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	FULL STACK DEVELOPMENT – II (Skill Oriented Course)	L	T	P	C
		0	1	2	2
III Year I Semester					
Course Objectives:					
The main objectives of the course are to • Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages • Building robust & responsive User Interfaces using popular JavaScript library ‘React.js’. Building robust backend APIs using ‘Express. js’ • Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)					
Course Outcomes (CO):					
• CO1: Building fast and interactive UIs • CO2: Applying Declarative approach for developing web apps • CO3: Understanding ES6 features to embrace modern JavaScript • CO4: Building reliable APIs with Express. js					
Experiments covering the Topics:					
• Introduction to DOM (Document Object Model), Ecma Script (ES6) standards and features like Arrow functions, Spread operator, Rest operator, Type coercion, Type hoisting, String literals, Array and Object Destructuring. • Basics of React. js like React Components, JSX, Conditional rendering Differences between Real DOM and Virtual DOM. • Important React.js concepts like React hooks, Props, React forms, Fetch API, Iterative rendering using JavaScript map() function. • JavaScript runtime environment node. js and its uses, Express. js and Routing, Micro-Services architecture and MVC architecture, database connectivity using (My SQL) • Introduction to My SQL, setting up MySQL and configuring, Databases, My SQL queries, subqueries, creating My SQL driver for database connectivity to Express. js server.					
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					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- 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 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

5. 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

Textbooks:

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. A
ZAT MARDAN, Full Stack Java Script: Learn Back bone. js, Node.js and Mongo DB. 2015

Reference Books:

1. Full-Stack JavaScript Development by Eric Bush.
2. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
3. Tomasz Dyl , Kamil Przeorski , Maciej Czarnecki, Mastering Full Stack React Web Development 2017

Online Learning Resources:



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

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://www.w3schools.com/typescript>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	TINKERING LAB	L	T	P	C
		0	0	2	1
III Year I Semester					
Course Objectives:					
The main objectives of the course are to					
• Encourage Innovation and Creativity • Provide Hands-on Learning and Impart Skill Development • Foster Collaboration and Teamwork • Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship • Impart Problem-Solving mind-set					
Course Outcomes (CO):					
The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.					
Experiments covering the Topics:					
These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.					
List of Experiments:					
1) Make your own parallel and series circuits using breadboard for any application of your choice. 2) Demonstrate a traffic light circuit using breadboard. 3) Build and demonstrate automatic Street Light using LDR. 4) Simulate the Arduino LED blinking activity in Tinkercad. 5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE. 6) Interfacing IR Sensor and Servo Motor with Arduino. 7) Blink LED using ESP32. 8) LDR Interfacing with ESP32. 9) Control an LED using Mobile App. 10) Design and 3D print a Walking Robot 11) Design and 3D Print a Rocket. 12) Build a live soil moisture monitoring project and monitor soil moisture levels of a remote place in your computer dashboard. 13) Demonstrate all the steps in design thinking to redesign a motor bike.					
Online Learning Resources:					
1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf 2) https://atl.aim.gov.in/ATL-Equipment-Manual/ 3) https://aim.gov.in/pdf/Level-1.pdf 4) https://aim.gov.in/pdf/Level-2.pdf 5) https://aim.gov.in/pdf/Level-3.pdf					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
III Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Big Data Analytics	PC	3-0-0	3
2.		Cloud Computing	PC	3-0-0	3
3.		Machine Learning	PC	3-0-0	3
4.		1. Software Testing Methodologies 2. Internet of things 3. Cyber Security	PE-II	3-0-0	3
5.		1. Cryptography and Network Security 2. Distributed Operating Systems 3. Mobile Adhoc Networks	PE-III	3-0-0	3
6		1. Principles of Database Management Systems. 2. Introduction to Cyber Security. 3. JAVA Programming.	OE-II	3-0-0	3
6.		Big Data Analytics Lab	PC	0-0-3	1.5
7.		Machine Learning Lab	PC	0-0-3	1.5
8.		Soft Skills or IELTS	SOC	0-1-2	2
9.		Technical Paper Writing	AC	2-0-0	0
TOTAL					23
Industrial/Research Internship (Mandatory) for 8 weeks duration during summer vacation					

Category	CREDITS
Professional Core	12
Professional Elective	6
Open Elective	3
Skill Oriented Course	2
Audit Course	0
TOTAL CREDITS	23





Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012.
3. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, CUP, 2012

Reference Books:

1. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & Sons, 2012.
2. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, “Harness the Power of Big Data: The IBM Big Data Platform”, Tata McGraw Hill Publications, 2012.
3. Arshdeep Bahga and Vijay Madisetti, “Big Data Science & Analytics: A Hands-On Approach”, VPT, 2016.
4. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)”, John Wiley & Sons, 2014.

Online Resources

1. Hadoop: <http://hadoop.apache.org/>
2. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
3. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	CLOUD COMPUTING	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Develop a comprehensive understanding of cloud computing fundamentals and service models. • Introduce students to various cloud architectures and underlying technologies. • Explore strategies for cost management, scalability, and resource optimization in the cloud environment. • Enable students to plan and execute cloud migration effectively and securely.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Explain and differentiate among cloud service models, deployment types, and architectures. • Design and develop scalable, fault-tolerant, and secure cloud-based solutions. • Deploy, monitor, and manage applications on major cloud platforms such as AWS, Azure, and Google Cloud. • Implement cloud security practices and cost-optimization techniques for enterprise solutions.					
UNIT - I	The Evolution of Cloud Computing				
Introduction: What Is the Cloud? The Emergence of Cloud Computing, The Global Nature of the Cloud, Cloud-Based Service Offerings, Grid Computing or Cloud Computing?, Is the Cloud Model Reliable?, Benefits of Using a Cloud Model, What About Legal Issues When Using Cloud Models?, What Are the Key Characteristics of Cloud Computing?, Challenges for the Cloud. The Evolution of Cloud Computing: Hardware Evolution, Internet Software Evolution, Server Virtualization.					
UNIT - II	Web Services Delivered from the Cloud				
Web Services Delivered from the Cloud: Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a-Service (MaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Building Cloud Networks: The Evolution from the MSP Model to Cloud Computing and Software-as-a-Service, The Cloud Data Center, Collaboration, Service-Oriented Architectures as a Step Toward Cloud Computing, Basic Approach to a Data Center-Based SOA.					
UNIT - III	Federation, Presence, Identity, and Privacy in the Cloud				
Federation, Presence, Identity, and Privacy in the Cloud: Federation in the cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information Systems, Security in the Cloud: Cloud security challenges - Software-as-a-service security.					
UNIT - IV	Common Standards in Cloud Computing				
Common Standards in Cloud Computing: The open cloud consortium, The distributed management task force, Standards for application developers, Standards for messaging, Standards for security.					
UNIT - V	Cloud Computing Case Studies				
Cloud Computing Case Studies: Google App Engine, Google Web Toolkit, Microsoft Azure Services Platform, Windows Live, Exchange Online, SharePoint Services, Microsoft Dynamics CRM, Amazon EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front, Amazon SQS.					
Textbooks:					
1. Cloud Computing implementation, management and security by John W. Ruttinghouse, James F. Ransome. CRC Press, Taylor & Francis group, 2010. 2. Cloud Computing a practical approach by Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. Tata McGraw Hill edition, 2010.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Cloud Application Architectures by George Reese. Oreilly publishers
2. Cloud computing and SOA convergence in your enterprise, by David S. Linthicum, Addison-Wesley



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	MACHINE LEARNING	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is introduced for students to					
1. Understand the foundational concepts and principles of Machine Learning, including supervised, unsupervised, and reinforcement learning.					
2. Analyze and apply different machine learning algorithms for classification, regression, clustering, and pattern recognition.					
3. Evaluate the performance of learning models using statistical metrics, cross-validation, and experimental techniques.					
4. Apply dimensionality reduction and feature engineering techniques to improve model efficiency and accuracy.					
5. Design, implement, and deploy machine learning solutions for real-world problems using programming tools and frameworks.					
Course Outcomes (CO):					
After completion of the course, students will be able to					
1. Identify suitable machine learning techniques for a given problem and select appropriate algorithms.					
2. Implement and evaluate supervised, unsupervised, and reinforcement learning models effectively.					
3. Apply dimensionality reduction, feature selection, and preprocessing techniques to enhance learning models.					
4. Analyze and interpret model performance using relevant evaluation metrics and statistical measures.					
5. Design and develop end-to-end machine learning applications for real-world datasets and scenarios.					
6. Demonstrate proficiency in using machine learning tools, libraries, and frameworks for practical problem solving					
UNIT - I	Definition of learning systems				
Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.					
Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.					
UNIT - II	Decision Tree Learning				
Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, searching for simple trees and computational complexity, Occam's razor, Overfitting, noisy data, and pruning.					
Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.					
UNIT - III	Computational Learning Theory				
Computational Learning Theory: Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.					
Rule Learning: Propositional and First-Order, Translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.					
UNIT - IV	Artificial Neural Networks				



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Artificial Neural Networks: Neurons and biological motivation, Linear threshold units. Perceptrons: representational limitation and gradient descent training, Multilayer networks and backpropagation, Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

UNIT - V **Bayesian Learning**

Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies.

Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.

Textbooks:

- 1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.
- 2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1. Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, O'Reilly.

Online Learning Resources:

1. Andrew Ng, Machine Learning <https://www.deeplearning.ai/machine-learning-yearning/>
2. Shai Shalev-Shwartz, Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press
<https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>
3. NPTEL Courses: <http://nptel.ac.in/courses/106106139/>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	SOFTWARE TESTING METHODOLOGIES (Professional Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives					
The course is designed to: • Introduce the fundamental principles and methodologies of software testing. • Enable students to design effective and efficient test cases. • Familiarize students with debugging strategies and testing automation tools. • Develop the ability to apply testing concepts to ensure software reliability and quality					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Understand and apply basic concepts and principles of software testing. • Design comprehensive test cases for various programming constructs and systems. • Identify and debug errors using systematic testing approaches. • Apply different testing methods and automation tools for real-world software systems. • Develop reliable and quality-oriented software through effective testing techniques.					
UNIT - I	Introduction				
Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.					
UNIT - II	Flow Testing				
Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques. Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.					
UNIT - III	Domain Testing				
Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.					
UNIT - IV	Logic Based Testing				
Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, Specifications.					
UNIT - V	Graph Matrices and Application				
State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, Testability Tips. Graph Matrices and Application: Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.					
Textbooks:					
1. Boris Beizer, “Software testing techniques”, Dreamtech, second edition, 2002.					
Reference Books:					
1. Brian Marick, <i>The Craft of Software Testing</i> , Pearson Education. 2. Yogesh Singh, <i>Software Testing</i> , Cambridge. 3. P.C. Jorgensen, <i>Software Testing</i> , 3rd Edition, Aurbach Publications (SPD). 4. N. Chauhan, <i>Software Testing</i> , Oxford University Press. 5. P. Ammann & J. Offutt, <i>Introduction to Software Testing</i> , Cambridge University Press. 6. Perry, <i>Effective Methods of Software Testing</i> , John Wiley, 2nd Edition, 1999					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTERNET OF THINGS (Professional Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives					
The course is designed to: - Understand the fundamental concepts and architecture of the Internet of Things and related protocols. - Discuss the requirements, evolution, and enabling technologies of IoT systems. - Explore various application areas where IoT can be effectively implemented. - Analyze IoT from a global perspective, including device management, data handling, and market potential using gateways and communication models.					
Course Outcomes (CO):					
After completion of the course, students will be able to: - Understand the general concepts and characteristics of the Internet of Things. - Apply IoT design principles to develop practical and scalable IoT solutions. - Analyze and differentiate various M2M communication models and IoT architectures. - Evaluate and address design and implementation challenges in IoT applications. - Develop IoT-based systems using sensors, actuators, and communication devices.					
UNIT - I	Introduction to IoT				
Definition and Characteristics of IoT, Physical Design of IoT, IoT Protocols, IoT Communication Models, IoT Communication APIs, Communication Protocols, Embedded Systems, IoT Levels and Templates.					
UNIT - II	Prototyping IoT Objects using Microprocessor/Microcontroller				
Working Principles of Sensors and Actuators, Setting up the Board, Programming for IoT, Reading from Sensors, Communication through Bluetooth and Wi-Fi.					
UNIT - III	IoT Architecture and Protocols				
Architecture Reference Model – Introduction, Reference Model and Architecture, IoT Reference Model, Protocols – 6LoWPAN, RPL, CoAP, MQTT, IoT Frameworks – ThingSpeak.					
UNIT - IV	Device Discovery and Cloud Services for IoT				
Device Discovery Capabilities – Registering a Device, Deregistering a Device, Introduction to Cloud Storage Models and Communication APIs, Web Server and Web Server for IoT.					
UNIT - V	UAV IoT				
Introduction to Unmanned Aerial Vehicles (UAVs)/Drones, Drone Types, Applications – Defense, Civil, Environmental Monitoring; UAV Elements and Sensors – Arms, Motors, Electronic Speed Controller (ESC), GPS, IMU, Ultrasonic Sensors; UAV Software – ArduPilot, Mission Planner; Internet of Drones (IoD) – Case Study: FlytBase.					
Textbooks:					
1. Vijay Madiseti and Arshdeep Bahga, <i>Internet of Things (A Hands-on Approach)</i>, 1st Edition, VPT, 2014. 2. K. Valavanis and George J. Vachtsevanos, <i>Handbook of Unmanned Aerial Vehicles</i>, Springer, 2016.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatias Karnouskos, and David Boyle, *From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence*, 1st Edition, Academic Press, 2014.
2. Arshdeep Bahga and Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2014.
3. Pethuru Raj and Anupama C. Raman, *The Internet of Things: Enabling Technologies and Use Cases*, CRC Press.
4. Francis daCosta, *Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*, 1st Edition, Apress Publications, 2013.

Online Learning Resources:

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>
3. <https://nptel.ac.in/courses/106105166/5>
4. <https://nptel.ac.in/courses/108108098/4>



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	CYBER SECURITY (Professional Elective -II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to:					
- To provide comprehensive awareness of cybercrimes, cyber offenses, and their legal implications. - To introduce students to the tools, techniques, and methodologies employed in cybercrime. - To develop an understanding of vulnerabilities in computing systems and strategies for mitigation. - To equip students with knowledge to investigate cyber threats and implement effective protection mechanisms. - To enable students to design and evaluate security solutions for organizations.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to:					
- Classify different types of cybercrimes and understand the legal framework under the Indian IT Act 2000. - Analyze system vulnerabilities and propose effective mitigation strategies. - Predict emerging security threats and assess their potential impact. - Investigate and evaluate various protection mechanisms and security tools. - Design robust cyber security solutions to safeguard organizational information assets.					
UNIT - I	Introduction to Cybercrime				
Introduction, Cybercrime and Information Security, Who are Cybercriminals, Classification of Cybercrimes, Legal Perspectives on Cybercrime, Indian Perspective, Cybercrime and the Indian IT Act 2000, A Global Perspective on Cybercrimes.					
UNIT - II	Cyber Offenses – How Criminals Plan Them				
Introduction, Planning of Cyber Attacks by Criminals, Social Engineering, Cyber Stalking, Cyber Cafes and Cybercrimes, Botnets as Fuel for Cybercrime, Attack Vectors, Cloud Computing Security Issues.					
UNIT - III	Cybercrime – Mobile and Wireless Devices				
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Era, Security Challenges Posed by Mobile Devices, Registry Settings, Authentication Service Security, Attacks on Mobile/Cell Phones. Security Implications for Organizations, Organizational Measures for Handling Mobile Devices, Security Policies and Measures for Mobile Computing Era, Laptops Security Considerations.					
UNIT - IV	Tools and Methods Used in Cybercrime				
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Viruses and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow.					
UNIT - V	Cyber Security – Organizational Implications				
Introduction, Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications, Social Media Marketing: Security Risks for Organizations, Social Computing and Challenges for Organizations.					
Textbooks:					
1. Nina Godbole and Sunil Belapure, <i>Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives</i> , Wiley India.					
Reference Books:					
1. James Graham, Richard Howard, and Ryan Otson, <i>Cyber Security Essentials</i> , CRC Press. 2. Chwan-Hwa (John) Wu and J. David Irwin, <i>Introduction to Cyber Security</i> , CRC Press, T&F Group.					



Online Learning Resources:

- | |
|--|
| <ol style="list-style-type: none">1. https://nptel.ac.in/courses/106105031/402. https://nptel.ac.in/courses/106105031/393. https://nptel.ac.in/courses/106105031/38 |
|--|



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	CRYPTOGRAPHY & NETWORK SECURITY (Professional Elective -III)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Develop a strong understanding of fundamental security concepts. • Master essential cryptographic techniques for data protection. • Explore network security protocols and their implementation. • Identify common network attacks and implement mitigation strategies. • Gain proficiency in network security tools and best practices.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Analyze and evaluate the security posture of networked systems. • Apply cryptographic algorithms to ensure data confidentiality, integrity, and authenticity. • Configure and utilize network security protocols and tools effectively. • Identify various types of network attacks and implement appropriate countermeasures. • Design and implement secure network architectures for practical applications. • Propose solutions to address common network security challenges. • Demonstrate awareness of ethical and legal considerations in cybersecurity.					
UNIT - I					
Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.					
Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.					
UNIT - II					
Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.					
Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.					
UNIT - III					
Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.					
UNIT - IV					
E-Mail Security: Pretty Good Privacy, S/MIME.					
IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.					
UNIT - V					
Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.					
Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls.					
Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.					
Textbooks:					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- | |
|--|
| <ol style="list-style-type: none">1. William Stallings, “Cryptography and Network Security”, 5th Edition, Pearson Education, 2011.2. Atul Kahate, “Cryptography and Network Security”, 2nd Edition, Mc Graw Hill, 2010.3. Bernard Menezes, “Network Security and Cryptography”, 1st Edition, CENGAGE Learning, 2010. |
|--|

Reference Books:

- | |
|---|
| <ol style="list-style-type: none">1. C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, “Cryptography and Network Security”, 1st Edition, Wiley India Pvt Ltd, 2011.2. Forouzan Mukhopadhyay, “Cryptography and Network Security”, 2nd Edition, Mc Graw Hill, 2010.3. Mark Stamp, Wiley India, “Information Security, Principles and Practice”, 2nd Edition, Wiley, 2011. |
|---|



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DISTRIBUTED OPERATING SYSTEMS (Professional Elective -III)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Understand basic concepts and functions of operating systems, including processes, threads, and scheduling algorithms. • Provide insight on various memory management techniques. • Expose the students to different techniques of handling deadlocks. • Explore the concept of file-system and its implementation issues. • Familiarize with the basics of Linux operating system. • Implement various schemes for achieving system protection and security.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Analyze and evaluate the security posture of networked systems. • Apply cryptographic algorithms to ensure data confidentiality, integrity, and authenticity. • Configure and utilize network security protocols and tools effectively. • Identify various types of network attacks and implement appropriate countermeasures. • Design and implement secure network architectures for practical applications. • Propose solutions to address common network security challenges. • Demonstrate awareness of ethical and legal considerations in cybersecurity.					
UNIT - I					
Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, 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, Operating system debugging, System Boot.					
UNIT - II					
Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client-server systems.					
Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples.					
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.					
Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems – Dining philosophers problem, Readers and writers problem.					
UNIT - III					
Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.					
Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.					
UNIT - IV					
Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.					
File Systems: Files, Directories, File system implementation, management, and optimization.					
Secondary-Storage Structure: Overview of disk structure and attachment, Disk scheduling, RAID structure, Stable storage implementation					
UNIT - V					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats, Cryptography as a security mechanism, User authentication, implementing security defenses, Firewalling to protect systems and networks, Computer security classification.

Case Studies: Linux, Microsoft Windows.

Textbooks:

1. Silberschatz A, Galvin P B, and Gagne G, *Operating System Concepts*, 9th edition, Wiley, 2016.
2. Tanenbaum A S, *Modern Operating Systems*, 3rd edition, Pearson Education, 2008 (Topics: Inter-process Communication and File systems).

Reference Books:

1. Tanenbaum A S, Woodhull A S, *Operating Systems Design and Implementation*, 3rd edition, PHI, 2006.
2. Dhamdhere D M, *Operating Systems: A Concept Based Approach*, 3rd edition, Tata McGrawHill, 2012.
3. Stallings W, *Operating Systems - Internals and Design Principles*, 6th edition, Pearson Education, 2009.
4. Nutt G, *Operating Systems*, 3rd edition, Pearson Education, 2004.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	MOBILE ADHOC NETWORKS (Professional Elective-III)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Provide knowledge of mobile ad hoc networks, design and implementation issues, and available solutions. • Explain routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid. • Introduce clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless. • Discuss the 802.11 Wireless LAN (WiFi) and Bluetooth standards.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Describe the unique issues in ad-hoc/sensor networks. • Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks. • Discuss the challenges in designing MAC, routing, and transport protocols for wireless ad-hoc/sensor networks. • Discuss the challenges in designing routing and transport protocols for wireless ad-hoc/sensor networks. • Comprehend the various sensor network platforms, tools, and applications.					
UNIT - I					
Introduction to Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs, and Challenges of MANETs. Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms, Position-based routing algorithms, Other routing algorithms.					
UNIT - II					
Data Transmission: Broadcast storm problem, Broadcasting, Multicasting, and Geocasting. TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad Hoc.					
UNIT - III					
Basics of Wireless, Sensors, and Applications: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.					
UNIT - IV					
Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots. Security: Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection Systems.					
UNIT - V					
Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes. Sensor Network Programming Challenges: Node-Level Software Platforms – Operating System: TinyOS, Imperative Language: nesC, Data flow style language: Tiny GALS. Node Level Simulators: ns-2 and its sensor network extension.					
Textbooks:					
1. C. Cordeiro and D. P. Aggarwal, <i>Ad Hoc and Sensor Networks – Theory and Applications</i>, World Scientific Publications, March 2006, ISBN – 981-256-681-3. 2. Feng Zhao and Leonidas Guibas, <i>Wireless Sensor Networks: An Information Processing Approach</i>, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	PRINCIPLES OF DATABASE MANAGEMENT SYSTEMS (Open Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Impart fundamental knowledge of database management systems, including database modeling, design, SQL, PL/SQL, and system implementation techniques. • Enable students to model ER diagrams for real-world applications and apply strategies for query optimization. • Introduce concurrency control mechanisms and transaction management concepts. • Provide a comprehensive understanding of database organization, storage, and retrieval mechanisms.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Design and implement a database for real-world applications using appropriate data models. • Define and manage transactions ensuring data integrity and consistency. • Create and manipulate database tables using SQL and PL/SQL. • Apply normalization techniques to organize data efficiently and prevent redundancy. • Formulate queries to retrieve, update, and manage data effectively. • Analyze and optimize query performance using relational algebra and query processing techniques. • Implement recovery and concurrency control mechanisms to ensure reliable database operations.					
UNIT - I					
Database Systems Overview: Database systems applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators. Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.					
UNIT - II					
Overview: SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization. Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal Relational Query Languages.					
UNIT - III					
Database Design: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms..					
UNIT - IV					
Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions. Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized Views, Advanced Topics in Query Optimization.					
UNIT - V					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Transaction Management: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

Concurrency Control: Lock-based Protocols, Deadlock Handling, Multiple Granularities, Timestamp-based Protocols, Validation-based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release, and Logical Undo Operations.

Textbooks:

1. A. Silberschatz, H.F. Korth, S. Sudarshan, *Database System Concepts*, 6th Edition, TMH, 2019.

Reference Books:

1. Shamkant B. Navathe, *Database Management System*, 6th Edition, Ramez Elmasri, PEA.
2. Carlos Coronel, Steven Morris, Peter Rob, *Database Principles: Fundamentals of Design, Implementation and Management*, Cengage Learning.
3. Raghurama Krishnan, Johannes Gehrke, *Database Management Systems*, 3rd Edition, TMH.



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO CYBER SECURITY (Open Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Provide awareness of different types of cybercrimes and cyber offenses. • Introduce tools and techniques commonly used in cybercrime investigations. • Enable understanding of legal perspectives and Indian IT Act 2000 related to cybercrime. • Develop knowledge to analyze system vulnerabilities and implement protection mechanisms.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Classify various cybercrimes and understand the provisions of the Indian IT Act 2000. • Analyze vulnerabilities in computing systems and propose effective solutions. • Anticipate and predict emerging security threats. • Investigate protection mechanisms and countermeasures for cyber threats. • Design and implement security solutions for organizational environments.					
UNIT - I	Introduction to Cybercrime				
Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, Global Perspective on Cybercrimes..					
UNIT - II	Cyber Offenses: How Criminals Plan Them				
Introduction, How Criminals Plan Attacks, Social Engineering, Cyber Stalking, Cyber Café and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vectors, Cloud Computing.					
UNIT - III	Cybercrime: Mobile and Wireless Devices				
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds, Security Challenges in Mobile Devices, Registry Settings, Authentication Security, Attacks on Mobile/Cell Phones, Organizational Security Policies and Measures, Laptops.					
UNIT - IV	Tools and Methods Used in Cybercrime				
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spyware, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.					
UNIT - V	Cyber Security: Organizational Implications				
Introduction, Cost of Cybercrimes and IPR issues, Web Threats for Organizations, Security and Privacy Implications, Social Media Marketing Risks, Social Computing Challenges for Organizations.					
Textbooks:					
1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.					
Reference Books:					
1. Cyber Security Essentials, James Graham, Richard Howard, Ryan Otson, CRC Press. 2. Introduction to Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press T&F Group.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	JAVA PROGRAMMING (Open Elective-II)	L	T	P	C
		3	0	0	3
III Year II Semester					
Course Objectives:					
The course is designed to: • Understand object-oriented programming concepts and problem-solving techniques. • Gain knowledge of inheritance, polymorphism, and their practical applications. • Implement packages, interfaces, exception handling, and concurrency mechanisms. • Design graphical user interfaces using Applets and Swing components. • Understand and utilize Java Database Connectivity (JDBC) architecture for database access.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: • Solve real-world problems using object-oriented programming techniques. • Apply code reusability through inheritance, packages, and interfaces. • Solve problems using Java collection framework and I/O classes. • Develop applications using multithreading, parallel streams, and applets for web applications. • Build GUIs, handle user-generated events, and access databases using the JDBC API.					
UNIT - I	Introduction				
Introduction to Object-Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.					
UNIT - II	Inheritance, Packages, Interfaces				
Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class. Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages. Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.					
UNIT - III	Exception Handling, Stream-Based I/O				
Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses. Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.					
UNIT - IV	Multithreading, Collections Framework				
Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication. The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.					
UNIT - V	Applet, GUI Programming with Swing, Accessing Databases with JDBC				
Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets. GUI Programming with Swings – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, JTextField, JLabel and ImageIcon, the swing buttons, JTextField, JScrollPane, JList, JComboBox, Trees, JTable, An overview of JMenuBar, JMenu and JMenuItem, creating a main menu, show message dialog, show confirm dialog, show input dialog, show option dialog, JDialog, create a modeless dialog.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Accessing Databases with JDBC: Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Textbooks:

1. Java: The Complete Reference, 9th Edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for Core and Advanced Learners, Sagayaraj et al., University Press.
4. Introduction to Java Programming, Y. Daniel Liang, Pearson Education.
5. Object-Oriented Programming through Java, P. Radha Krishna, University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd Edition, Oxford University Press.
7. Java Programming and Object-Oriented Application Development, R.A. Johnson, Cengage Learning.

Online Learning Resources:

1. [W3Schools Java OOP](#)
2. [PeterIndia Java Files](#)



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	BIG DATA ANALYTICS LAB	L	T	P	C
		0	0	3	1.5
III Year II Semester					
Course Objectives:					
• To implement MapReduce programs for processing big data. • To realize storage of big data using MongoDB. • To analyze big data using machine learning techniques such as Decision tree classification and clustering.					
Course Outcomes (CO):					
• Students will be able to develop and implement MapReduce programs for distributed data processing. • Students will gain practical experience with NoSQL databases • Students will be able to apply techniques for data preprocessing • Students will learn to generate reports and visualize data insights using appropriate tools					
List of Experiments:					
1. Install, configure and run python, numPy and Pandas. 2. Install, configure and run Hadoop and HDFS. 3. Visualize data using basic plotting techniques in Python. 4. Implement NoSQL Database Operations: CRUD operations, Arrays using MongoDB. 5. Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB. 6. Implement word count / frequency programs using MapReduce. 7. Implement a MapReduce program that processes a dataset. 8. Implement clustering techniques using SPARK. 9. Implement an application that stores big data in MongoDB / Pig using Hadoop / R.					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	MACHINE LEARNING LAB	L	T	P	C
		0	0	3	1.5
III Year II Semester					
Course Objectives:					
• Make use of Data sets in implementing the machine learning algorithms • Implement the machine learning concepts and algorithms in any suitable language of choice.					
Course Outcomes (CO):					
After completion of the course, students will be able to • Understand the Mathematical and statistical perspectives of machine learning algorithms through python programming • Appreciate the importance of visualization in the data analytics solution. • Derive insights using Machine learning algorithms					
List of Experiments:					
Note: a. The programs can be implemented in either JAVA or Python. b. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python. c. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students. 1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file. 2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples. 3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample. 4. Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets. 5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. 6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set. 7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API. 8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program. 9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem. 10. Implement the non-parametric Locally Weighted Regression algorithm in order to					



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

fit data points. Select appropriate data set for your experiment and draw graphs.

Projects

1. Predicting the Sale price of a house using Linear regression
2. Spam classification using Naïve Bayes algorithm
3. Predict car sale prices using Artificial Neural Networks
4. Predict Stock market trends using LSTM
5. Detecting faces from images

References:

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.

Online Learning Resources/ Virtual Labs:

- 1) [Machine Learning A-Z \(Python & R in Data Science Course\) | Udemy](#)
- 2) [Machine Learning | Coursera](#)



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	SOFT SKILLS (Skill Oriented Course)	L	T	P	C
		0	1	2	2
III Year II Semester					
Course Objectives:					
- To encourage all round development of the students by focusing on soft skills - To make the students aware of critical thinking and problem-solving skills - To develop leadership skills and organizational skills through group activities - To function effectively with heterogeneous teams					
Course Outcomes (CO):					
By the end of the program students should be able to - Memorize various elements of effective communicative skills - Interpret people at the emotional level through emotional intelligence - Apply critical thinking skills in problem solving - Analyse the needs of an organization for team building - Judge the situation and take necessary decisions as a leader - Develop social and work-life skills as well as personal and emotional well-being					
UNIT – I	Soft Skills & Communication Skills				
Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication					
Activities:					
Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity (The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)					
Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.					
Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.					
Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation					
UNIT – II	Critical Thinking				
Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking					
Activities:					
Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis					
UNIT – III	Problem Solving & Decision Making				
Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles					
Activities:					
Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.					
Case Study & Group Discussion					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

UNIT – IV	Emotional Intelligence & Stress Management
Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips Activities: Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates.	
UNIT – V	Leadership Skills
Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk- Taking - Team Building - Time Management Activities: Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc. NOTE:- 1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill. 2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.	
Textbooks:	
1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012) 2. Personality Development and Soft Skills: Preparing for Tomorrow, <u>Dr Shikha Kapoor</u> Publisher : I K International Publishing House; 0 edition (February 28, 2018)	
Reference Books:	
1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018. 2. Soft Skills By Alex K. Published by S.Chand 3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley. 4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books 5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press 6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India	
Online Learning Resources:	
1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCYtvXh0E_y-bOO1_q 2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KIJ 3. https://youtu.be/-Y-R9hDI7IU 4. https://youtu.be/gkLsn4ddmTs 5. https://youtu.be/2bf9K2rRWwo 6. https://youtu.be/FchfE3c2jzc	



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	Technical Report Writing & IPR	L	T	P	C
		2	0	0	-
III Year II Semester					
Course Objectives:					
- To enable the students to practice the basic skills of research paper writing - To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights. - To practice the basic skills of performing quality literature review - To help them in knowing the significance of real life practice and procedure of Patents. - To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks					
Course Outcomes (CO):					
At the end of the course, students will be able to - Identify key secondary literature related to their proposed technical paper writing. - Explain various principles and styles in technical writing - Use the acquired knowledge in writing a research/technical paper - Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc. - Evaluate different forms of IPR available at national & international level - Develop skill of making search of various forms of IPR by using modern tools and techniques					
UNIT – I	Principles of Technical Writing				
Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language -highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing .					
UNIT – II	Technical Research Paper Writing				
Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature- Problem sand Framing Research Questions- Synopsis					
UNIT – III	Process of research				
Process of research: publication mechanism: types of journals- indexing-seminars- conferences- proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules					
UNIT – IV	Introduction to Intellectual property				
Introduction to Intellectual property: Introduction, types of intellectual property, international nizations, agencies and treaties, importance of intellectual property rights Trademarks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.					
UNIT – V	Law of copy rights				
Law of copy rights: Fundamentals of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, intellectual property audits.					
Textbooks:					
1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013 2. Meenakshi Raman, Sangeeta Sharma. Technical Communication: Principles and practices. Oxford.					
Online Learning Resources:					
1. https://theconceptwriters.com.pk/principles-of-technical-writing/ 2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html 3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

4. <https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/>
5. <https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf>
6. <https://lawbhoomi.com/intellectual-property-rights-notes/>
7. <https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf>



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
IV Year I Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Deep Learning	PC	3-0-0	3
2.		1.Human Resource & Project Management 2.E-Business 3.Management Science	MGT	2-0-0	2
3.		1.Software Architecture & Design Patterns 2.Augmented Reality and Virtual Reality 3. Block Chain Technology	PE-IV	3-0-0	3
4.		1.Data Science 2.Quantum Computing 3.Agile Methodologies	PE-V	3-0-0	3
5.		1.Fundamentals of Computer Networks 2.Introduction to Data Science. 3. Introduction to Quantum Computing	OE-III	3-0-0	3
6		1.Fundamentals of Operating Systems. 2. Fundamentals of Cloud Computing. 3. Introduction to Machine Learning.	OE-IV	3-0-0	3
7		Mobile Application development	SOC	0-1-2	2
8		Prompt Engineering	AC	2-0-0	0
9		Evaluation of Summer Internship	PR	-	2
TOTAL					21

Category	CREDITS
Professional Core	3
Professional Elective	6
Open Elective	6
Skill Oriented Course	2
Audit Course	0
Summer Internship	2
TOTAL CREDITS	23



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DEEP LEARNING	L	T	P	C
		0	1	2	2
IV Year I Semester					
Course Objectives:					
• To understand the fundamental concepts of neural networks. • To explore advanced deep learning architectures. • To master deep learning frameworks and tools. • To understand ethical considerations and limitations in deep learning.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Demonstrate the basic concepts, fundamental learning techniques, and layers. • Discuss neural network training and various random models. • Explain different types of deep learning network models and classify probabilistic neural networks and sequence model neural networks. • Implement deep learning techniques using appropriate tools.					
UNIT – I					
Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. Feed forward neural network: Artificial Neural Network, activation function, multi-layer neural network.					
UNIT – II					
Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.					
UNIT – III					
Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.					
UNIT IV					
Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.					
Sequence Modelling: LSTM, Gated RNNs, and Deep Generative Models.					
UNIT V:					
Applications: Object recognition, sparse coding, computer vision, natural language processing.					
Introduction to Deep Learning Tools: Caffe, Theano, Torch.					
Text Books:					
1. Goodfellow, I., Bengio, Y., and Courville, A., <i>Deep Learning</i> , MIT Press, 2016. 2. Bishop, C. M., <i>Pattern Recognition and Machine Learning</i> , Springer, 2006.					
References					
1. Yegnanarayana, B., <i>Artificial Neural Networks</i> , PHI Learning Pvt. Ltd, 2009. 2. Golub, G. H., and Van Loan, C. F., <i>Matrix Computations</i> , JHU Press, 2013. 3. Satish Kumar, <i>Neural Networks: A Classroom Approach</i> , Tata McGraw-Hill Education, 2004.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	HUMAN RESOURCE AND PROJECT MANAGEMENT (Management Elective)	L	T	P	C
		0	1	2	2
IV Year I Semester					
Course Objectives:					
The objectives of this course are: ● To provide fundamental knowledge on Management, Administration, Organization and its concepts. ● To make the students understand the role of management in Production. ● To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training and Development, Job Evaluation, and Merit Rating concepts. ● To create awareness on identifying Strategic Management areas and the PERT/CPM for better Project Management. ● To make the students aware of the contemporary issues in management.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: ● Understand the concepts and principles of management and designs of organization in a practical world. ● Apply the knowledge of Work-study principles and Quality Control techniques in industry. ● Analyze the concepts of HRM in Recruitment, Selection, and Training and Development. ● Evaluate PERT/CPM techniques for projects of an enterprise, estimate time and cost of projects, and analyze business through SWOT. ● Create and adapt modern technology in management science.					
UNIT – I	INTRODUCTION TO MANAGEMENT				
Management - Concept and meaning - Nature - Functions - Importance of Management. Schools of Management Thought - Taylor’s Scientific Theory - Henry Fayol’s Principles – Abraham Maslow’s Hierarchy Theory of Needs. Organisational Designs - Line Organization - Line and Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee Form of Organization. Social Responsibilities of Management.					
UNIT – II	OPERATIONS MANAGEMENT				
Principles and Types of Plant Layout - Methods of Production (Job, Batch, and Mass Production). Work Study - Statistical Quality Control - Deming’s Contribution to Quality. Material Management - Objectives - Inventory Functions - Types - Inventory Techniques - EOQ - ABC Analysis - Purchase Procedure and Stores Management. Marketing Management - Functions of Marketing - Marketing Mix - Channels of Distribution - Marketing Strategies based on Product Life Cycle.					
UNIT – III	HUMAN RESOURCES MANAGEMENT (HRM)				
HRM - Definition and Meaning – Nature - Managerial and Operative Functions - Evolution of HRM - Job Analysis - Human Resource Planning (HRP) - Employee Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the-job and Off-the-job Training Methods - Performance Appraisal Concept - Methods of Performance Appraisal - Placement - Employee Induction - Wage and Salary Administration					
UNIT IV STRATEGIC AND PROJECT MANAGEMENT					
Definition and Meaning - Setting of Vision, Mission, Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis. Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) - Identifying Critical Path - Probability of Completing the Project within Given Time - Project Cost Analysis - Project Crashing (Simple Problems).					
UNIT V: CONTEMPORARY ISSUES IN MANAGEMENT					
The Concept of Management Information System (MIS) - Materials Requirement Planning (MRP) - Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- Supply Chain Management (SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineering and Benchmarking - Balanced Score Card - Knowledge Management.

Text Books:

1. A.R. Aryasri, *Management Science*, TMH, 2013.
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi, 2012

References

1. Koontz & Weihrich, *Essentials of Management*, 6th Edition, TMH, 2005.
2. Thomas N. Duening & John M. Ivancevich, *Management Principles and Guidelines*, Biztantra.
3. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
4. Samuel C. Certo, *Modern Management*, 9th Edition, PHI, 2005



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	E-BUSINESS (Management Elective)			L	T	P	C
				0	1	2	2
IV Year I Semester							
Course Objectives:							
The objectives of this course are: ● To provide knowledge on the emerging concept of E-Business and related aspects. ● To understand various electronic markets and business models. ● To impart information about electronic payment systems and banking. ● To create awareness on security risks and challenges in E-Commerce. ● To make students aware of different E-Marketing channels and strategies.							
Course Outcomes (CO):							
At the end of the course, the students will be able to: ● Remember E-Business and its nature, scope, and functions. ● Understand E-Market Models practiced by organizations. ● Apply the concepts of E-Commerce in the present globalized world. ● Analyze various E-Payment Systems and the importance of Net Banking. ● Evaluate Market Research Strategies and E-Advertisements.							
UNIT – I	ELECTRONIC BUSINESS						
Introduction – Nature, meaning, significance, functions, and advantages – Definition of Electronic Business – Functions of Electronic Commerce (EC) – Advantages and Disadvantages of E-Commerce – E-Commerce and E-Business, Internet Services, Online Shopping – E-Commerce Opportunities for Industries.							
UNIT – II	ELECTRONIC MARKETS AND BUSINESS MODELS						
Introduction – E-Shops – E-Malls – E-Groceries – Portals – Vertical Portals – Horizontal Portals – Advantages of Portals – Business Models – Business to Business (B2B) – Business to Customers (B2C) – Business to Government (B2G) – Auctions – B2B Portals in India.							
UNIT – III	ELECTRONIC PAYMENT SYSTEMS						
Introduction to Electronic Payment Systems (EPS) – Types of Electronic Payments – Credit/Debit Cards, E-Wallets, UPI, and Cryptocurrencies – Smart Cards and Digital Wallets: Features and Usage – Electronic Fund Transfer (EFT): Role in Business Transactions – Infrastructure Requirements and Regulatory Aspects of E-Payments.							
UNIT IV SECURITY							
Security Risks and Challenges in Electronic Commerce – Cyber Threats – Phishing, Hacking, Identity Theft, and Malware – Digital Signatures and Certificates – Security Protocols over Public Networks (HTTP, SSL, TLS) – Firewalls in Securing E-Business Platforms.							
UNIT V: MARKETING							
Introduction – Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Market Research – E-Marketing Planning: Online Branding, Social Media Marketing, and Email Marketing – E-Business Strategies: Digital Advertising, Content Marketing, and Analytics – E-Customer Relationship Management (e-CRM) – E-Supply Chain Management (e-SCM).							
Text Books:							
1. Arati Oturkar & Sunil Khilari, <i>E-Business</i>, Everest Publishing House, 2022. 2. P.T.S. Joseph, <i>E-Commerce</i>, Fourth Edition, Prentice Hall of India, 2011.							
References							
1. Debjani, Kamalesh K. Bajaj, <i>E-Commerce</i>, Second Edition, Tata McGraw-Hill, 2005. 2. Dave Chaffey, <i>E-Commerce E-Management</i>, Second Edition, Pearson, 2012. 3. Henry Chan, <i>E-Commerce Fundamentals and Applications</i>, Raymond Leatham, Wiley India, 2007.							



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

4. S. Jaiswal, *E-Commerce*, Galgotia Publications Pvt. Ltd., 2003.



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	MANAGEMENT SCIENCE (Management Elective-I)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are - To provide fundamental knowledge on Management, Administration, Organization & its concepts. - To make the students understand the role of management in Production - To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts - To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management					
Course Outcomes(CO):					
At the end of the course, the students will be able to: - Understand the concepts & principles of management and designs of organization in a practical world - Apply the knowledge of Work-study principles & Quality Control techniques in industry - Analyze the concepts of HRM in Recruitment, Selection and Training & Development. - Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.					
UNIT-I	INTRODUCTION TO MANAGEMENT				
Management - Concept and meaning - Nature-Functions - importance of Management. Schools of Management Thought - Taylor’s Scientific Theory-Henry Fayol’s principles – Abraham Maslow’s hierarchy theory of needs - Organizational Designs - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.					
UNITII	OPERATIONS MANAGEMENT				
Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control - Deming’s contribution to Quality. Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - Marketing Management - Functions of Marketing - Marketing Mix - Channels of Distribution - Marketing Strategies based on Product Life Cycle..					
UNIT-III	HUMAN RESOURCES MANAGEMENT (HRM)				
HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment- Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration.					
UNIT-IV	STRATEGIC & PROJECT MANAGEMENT				
Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis -Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).					
UNIT-V	CONTEMPORARY ISSUES IN MANAGEMENT				
The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re- engineering and Bench Marking - Balanced Score Card - Knowledge Management.					
Textbooks:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. A.R Aryasri, “Management Science”, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS (Professional Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Students will grasp the foundational concepts of software architecture, including its importance and various architectural styles. • Students will learn to apply core architectural principles effectively in software design. • Students will differentiate between architectural patterns and design patterns. • Students will understand the role of architecture in achieving system quality attributes.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Demonstrate a deep understanding of fundamental software architecture concepts, including different architectural styles (e.g., client-server, microservices, layered), their advantages, disadvantages, and trade-offs involved in architectural decision-making. • Grasp how architecture impacts system quality attributes such as scalability, performance, security, and maintainability. • Apply appropriate design patterns to solve recurring software design problems, leading to more flexible, reusable, and maintainable code.					
UNIT-I	The Architecture Business Cycle				
Introduction: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a “good” architecture? What software architecture is and is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.					
UNITII	Architectural Styles and Case Studies				
Architectural Styles and Case Studies: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style.					
UNIT-III	Quality				
Quality: Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles.					
UNIT-IV	Architectural Patterns				
Architectural Patterns: Introduction; From mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control.					
UNIT-V	Designing and Documenting Software Architecture				
Designing and Documenting Software Architecture: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views.					
Textbooks:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- | |
|---|
| <ol style="list-style-type: none">1. Len Bass, Paul Clements, Rick Kazman: <i>Software Architecture in Practice</i>, 2nd Edition, Pearson Education, 2003.2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: <i>Pattern-Oriented Software Architecture, A System of Patterns</i>, Volume 1, John Wiley and Sons, 2007.3. Mary Shaw and David Garlan: <i>Software Architecture- Perspectives on an Emerging Discipline</i>, PHI, 2007. |
|---|

Reference Books:

- | |
|---|
| <ol style="list-style-type: none">1. E. Gamma, R. Helm, R. Johnson, J. Vlissides: <i>Design Patterns- Elements of Reusable Object-Oriented Software</i>, Pearson Education, 1995. |
|---|



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	AUGMENTED REALITY & VIRTUAL REALITY (Professional Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Build a strong foundation in Augmented Reality (AR) concepts and their real-world applications. • Provide historical and modern perspectives on Virtual Reality (VR) systems and their engineering aspects. • Explain the fundamentals of visual and auditory perception relevant to AR/VR. • Introduce AR/VR software architectures, tracking methods, and interaction techniques. • Prepare students to understand and implement immersive experiences in AR and VR environments.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Describe the working principles, components, and applications of AR systems. • Analyze AR software architectures and system design considerations. • Explain visual perception and rendering techniques used in VR environment • Understand interaction modalities and auditory perception in VR. • Apply knowledge of AR/VR tracking, rendering, and immersive experience principles to real-world scenarios.					
UNIT-I	Introduction to Augmented Reality				
Augmented Reality: Definition, history, examples, and related fields. Displays: Multimodal displays, visual perception, requirements and characteristics, spatial display model, visual displays. Tracking: Tracking, calibration, registration, coordinate systems, stationary tracking systems, mobile sensors.					
UNITII	Computer Vision for Augmented Reality				
Marker tracking, multiple-camera infrared tracking, natural feature tracking by detection, outdoor tracking. Interaction: Output modalities, input modalities, tangible interfaces, virtual user interfaces on real surfaces, augmented paper, multi-view interfaces, haptic interaction. Software Architectures: AR application requirements, software engineering requirements, distributed object systems, dataflow, scene graphs.					
UNIT-III	Introduction to Virtual Reality				
Virtual Reality: Definition, history, human physiology and perception. The Geometry of Virtual Worlds: Geometric models, axis-angle representations of rotation, viewing transformations. Light and Optics: Basic behavior of light, lenses, optical aberrations, the human eye, cameras, displays.					
UNIT-IV	The Physiology of Human Vision				
From the cornea to photoreceptors, from photoreceptors to the visual cortex, eye movements, implications for VR. Visual perception: Depth, motion, and color perception. Visual rendering: Ray tracing and shading models, rasterization, correcting optical distortions, improving latency and frame rates, immersive photos and videos.					
UNIT-V	Motion, Interaction, and Audio in VR				
Motion in real and virtual worlds: Velocities and accelerations, vestibular system, physics in virtual worlds, mismatched motion and vection. Interaction: Motor programs and remapping, locomotion, social interaction. Audio: Physics of sound, physiology of human hearing, auditory perception, auditory rendering.					
Textbooks:					
1. Schmalstieg, D., Hollerer, T. Augmented Reality: Principles & Practice, Pearson Education India, 2016. 2. LaValle, S. M., Virtual Reality, Cambridge University Press, 2016.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Fowler, A., AR Game Development, Apress, 2018.
2. Sherman, W. R., Craig, A. B., Understanding Virtual Reality: Interface, Application, and Design, Morgan Kaufmann, 2002.
3. Craig, A. B., Sherman, W. R., Will, J. D., Developing Virtual Reality Applications: Foundations of Effective Design, Morgan Kaufmann, 2009.
4. O'Connell, K., Designing for Mixed Reality, O'Reilly Media, 2016.
5. Siltanen, S., Theory and Applications of Marker-Based Augmented Reality, 2012.
6. Kim, G. J., Designing Virtual Systems: The Structured Approach, 2005.



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	BLOCK CHAIN TECHNOLOGY (Professional Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Develop a strong understanding of core blockchain concepts, including distributed ledger technology. • Gain familiarity with different blockchain platforms and ecosystems. • Understand the role of cryptocurrencies, including creation, transactions, wallets, and economic incentives. • Explore practical applications of blockchain technology beyond cryptocurrencies, such as supply chain management and finance. • Evaluate the feasibility, benefits, and challenges of implementing blockchain solutions in real-world scenarios.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Explain fundamental blockchain concepts and distributed ledger technology. • Identify and evaluate blockchain applications across various industries. • Understand and address security, privacy, and ethical considerations in blockchain systems. • Analyze business requirements and determine the suitability of blockchain solutions compared to traditional systems. • Apply blockchain knowledge to develop practical solutions and use cases in real-world contexts.					
UNIT-I	Blockchain Concepts				
Introduction to blockchain, blockchain application examples (e.g., escrow), blockchain stack, evolution from Web 2.0 to decentralized Web, domain-specific blockchain applications, benefits and challenges. Blockchain application templates, components, and design methodology.					
UNITII	Setting up Ethereum Development Tools				
Overview of Ethereum clients, programming languages, TestRPC, Mist Wallet, MetaMask, Web3 JavaScript API, and Truffle. Ethereum accounts: keypairs, externally owned accounts (EOA), and contract accounts.					
UNIT-III	Smart Contracts				
Definition and structure of smart contracts, setting up and interacting with contracts using Geth client and Mist Wallet.					
UNIT-IV	Smart Contracts (Continued) and Decentralized Applications				
Smart contract examples and patterns. Introduction to decentralized applications (DApps), implementation, and case studies.					
UNIT-V	Mining				
Consensus mechanisms in blockchain networks, mining processes, block validation, and state storage in Ethereum.					
Textbooks:					
1. Arshadeep Bahga, Vijay Madiseti, <i>Blockchain Applications: A Hands-On Approach</i>, VPT, 2017. 2. Chandramouli Subramanian, Asha A George, Abhilash K A, Meena Karthikeyan, <i>Blockchain Technology</i>, University Press, 2021.					
Reference Books:					
1. Imran Bashir, <i>Mastering Blockchain</i>, Packt Publishing Ltd, 2017. 2. Melanie Swan, <i>Blockchain Blueprint for a New Economy</i>, O'Reilly, 2015.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	DATA SCIENCE (Professional Elective-V)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Introduce students to the fundamental concepts and principles of data science, including its lifecycle, methodologies, and ethical considerations. • Provide a strong foundation in statistical and mathematical concepts underlying data science techniques. • Enable students to collect, clean, transform, and prepare raw data from diverse sources, handling missing values, outliers, and inconsistencies effectively. • Develop skills to explore datasets visually and statistically to identify patterns, relationships, and anomalies, forming initial hypotheses and understanding data characteristics.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Describe the stages of a data science project, from problem definition and data acquisition to model deployment and maintenance. • Explain core statistical methods and machine learning algorithms used for data analysis and prediction. • Recognize ethical considerations, privacy concerns, and potential biases in data collection, analysis, and deployment of data-driven models. • Understand various data types (numerical, categorical, textual, time-series) and data structures, and their implications for analysis. • Apply data exploration, feature generation, selection techniques, and basic machine learning algorithms to solve real-world problems.					
UNIT-I	Introduction to Data Science				
Introduction: Definition of Data Science, Big Data and Data Science hype, overcoming hype, importance of Datafication, current landscape, required skill sets, statistical inference, populations and samples, statistical modelling, and the Data Science Process.					
UNITII	Exploratory Data Analysis and the Data Science Process				
Exploratory Data Analysis (EDA): Tools (plots, graphs, summary statistics), philosophy of EDA, Data Science Process, case study: Real Direct. Introduction to basic machine learning algorithms: Linear Regression, k-Nearest Neighbours (k-NN), k-Means.					
UNIT-III	Machine Learning Algorithms and Applications				
Motivating application: Filtering Spam. Limitations of Linear Regression and k-NN for spam filtering. Naive Bayes algorithm for spam classification. Data wrangling using APIs and web scraping tools.					
UNIT-IV	Feature Generation and Feature Selection				
Feature Generation and Selection: Extracting meaningful features from data. Application: Customer retention. Brainstorming, role of domain expertise, imagination. Feature selection algorithms: Filters, Wrappers, Decision Trees, Random Forests.					
UNIT-V	Recommendation Systems				
Building user-facing data products and recommendation engines. Dimensionality reduction techniques: Singular Value Decomposition (SVD), Principal Component Analysis (PCA). Data visualization principles, tools, and exercises to build a recommendation system. Data Visualization - Basic principles, ideas and tools for data visualization.					
Textbooks:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Cathy O’Neil and Rachel Schutt, *Doing Data Science: Straight Talk From The Frontline*, O’Reilly, 2014.

Reference Books:

1. Kevin P. Murphy, *Machine Learning: A Probabilistic Perspective*, 2013.
2. Foster Provost and Tom Fawcett, *Data Science for Business*, 2013.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, *Elements of Statistical Learning*, 2nd Edition, 2009.
4. Avrim Blum, John Hopcroft, Ravindran Kannan, *Foundations of Data Science*.
5. Mohammed J. Zaki, Wagner Miera Jr., *Data Mining and Analysis*, Cambridge University Press, 2014.
6. Jiawei Han, Micheline Kamber, Jian Pei, *Data Mining: Concepts and Techniques*, 3rd Edition, 2011



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	QUANTUM COMPUTING (Professional Elective-V)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are - Understand the fundamentals of quantum mechanics, including superposition, entanglement, and quantum measurement. - Comprehend the principles of quantum information and how information is encoded and manipulated in quantum systems. - Familiarize with quantum gates and circuits, including constructing and analyzing basic quantum circuits. - Analyze and understand key quantum algorithms such as Deutsch-Jozsa, Shor's, and Grover's, along with their underlying principles and advantages.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: - Explain core concepts of quantum mechanics relevant to quantum computation. - Describe and apply various quantum gates to construct simple quantum circuits. - Implement and simulate basic quantum algorithms using quantum programming tools. - Analyze the computational complexity and potential speedup of quantum algorithms compared to classical algorithms.					
UNIT-I	Foundation				
Overview of traditional computing: Church-Turing thesis, circuit model of computation, reversible computation. Introduction to quantum physics and computation: Dirac notation, Hilbert spaces, dual vectors, operators, spectral theorem, functions of operators, tensor products, and Schmidt decomposition theorem.					
UNIT-II	Qubits and Quantum Model of Computation				
Quantum states: Time evolution of closed systems, composite systems, measurement, mixed states, and general quantum operations. Quantum circuit model: Quantum gates, universal sets of quantum gates, unitary transformations, and construction of quantum circuits.					
UNIT-III	Quantum Algorithms – I				
Superdense coding, quantum teleportation, applications of teleportation, probabilistic vs. quantum algorithms, phase kick-back. Key algorithms: Deutsch algorithm, Deutsch-Jozsa algorithm, Simon's algorithm, quantum phase estimation, quantum Fourier transform, eigenvalue estimation.					
UNIT-IV	Quantum Algorithms – II				
Order-finding problem and approaches, Shor's algorithm for order finding, discrete logarithms, hidden subgroup problems. Grover's quantum search algorithm, amplitude amplification, quantum amplitude estimation, quantum counting, and searching without knowing the success probability.					
UNIT-V	Quantum Computational Complexity and Error Correction				
Computational complexity: Black-box model, lower bounds for searching, general black-box lower bounds, polynomial method, block sensitivity, adversary methods. Classical error correction: Three-bit code, fault tolerance. Quantum error correction: Three- and nine-qubit codes, fault-tolerant quantum computation					
Textbooks:					
1. P. Kaye, R. Laflamme, and M. Mosca, <i>An Introduction to Quantum Computing</i> , Oxford University Press, 1999.					
Reference Books:					
1. V. Sahni, <i>Quantum Computing</i> , Tata McGraw-Hill Publishing Company, 2007.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	AGILE METHODOLOGIES (Professional Elective-V)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are - Grasp core values, principles, and mindset behind Agile software development and project management. - Differentiate Agile from traditional methodologies by identifying key differences, advantages, and disadvantages compared to Waterfall and other approaches. - Gain in-depth knowledge of popular Agile frameworks, particularly Scrum, and get an introduction to others such as Kanban and Lean.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: - Articulate and defend core principles of the Agile Manifesto and explain how they guide Agile practices. - Select and justify the appropriate Agile methodology for a given project context. - Effectively participate as a team member in an Agile development environment, demonstrating understanding of their role and contributions. - Create and refine user stories, define acceptance criteria, and prioritize product backlogs as a Product Owner proxy or team member.					
UNIT-I	Agile Methodology				
Theories for Agile Management; Agile Software Development; Traditional Model vs. Agile Model; Classification of Agile Methods; Agile Manifesto and Principles; Agile Project Management; Agile Team Interactions; Ethics in Agile Teams; Agility in Design and Testing; Agile Documentation; Agile Drivers, Capabilities, and Values.					
UNITII	Agile Processes				
Lean Production; Scrum, Crystal, Feature-Driven Development (FDD); Adaptive Software Development; Extreme Programming (XP): Method Overview, Lifecycle, Work Products, Roles, and Practices.					
UNIT-III	Agility and Knowledge Management				
Agile Information Systems; Agile Decision Making; Earl’s Schools of Knowledge Management (KM); Institutional Knowledge Evolution Cycle: Development, Acquisition, Refinement, Distribution, Deployment, Leveraging; KM in Software Engineering; Managing Software Knowledge; Challenges of Migrating to Agile; Agile Knowledge Sharing; Role of Story-Cards; Story-Card Maturity Model (SMM).					
UNIT-IV	Agility and Requirements Engineering				
Impact of Agile Processes in Requirements Engineering (RE); Current Agile Practices and Variance; Overview of RE Using Agile; Managing Unstable Requirements; Requirements Elicitation; Agile Requirements Abstraction Model; Requirements Management in Agile Environment; Agile Requirements Prioritization; Agile Requirements Modeling and Generation; Concurrency in Agile Requirements Generation.					
UNIT-V	Agility and Quality Assurance				
Agile Product Development; Agile Metrics; Feature-Driven Development (FDD); Financial and Production Metrics in FDD; Agile Approach to Quality Assurance; Test-Driven Development (TDD); Agile Approach in Global Software Development.					
Textbooks:					
- David J. Anderson and Eli Schragenheim, <i>Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results</i>, Prentice Hall, 2003. - Hazza and Dubinsky, <i>Agile Software Engineering, Series: Undergraduate Topics in Computer Science</i>, Springer, 2009.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Craig Larman, *Agile and Iterative Development: A Manager's Guide*, Addison-Wesley, 2004.
2. Kevin C. Desouza, *Agile Information Systems: Conceptualization, Construction, and Management*, Butterworth-Heinemann, 2007.



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	FUNDAMENTALS OF COMPUTER NETWORKS (Open Elective Course- III)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Provide a comprehensive understanding of the fundamental concepts and principles of computer networks. • Introduce the layered architecture approach for network design and communication. • Familiarize students with various network protocols used in Internet environments. • Explain the structure and functions of IP, TCP, and UDP headers. • Highlight the applications of Internet technologies in real-world scenarios. • Discuss the key design issues and challenges involved in computer network systems.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Identify the hardware and software components involved in computer networking. • Design and implement software solutions for network communication. • Develop and analyze routing and congestion control algorithms. • Evaluate the efficiency and effectiveness of existing routing protocols. • Explain the functionalities of different layers within the network architecture. • Select and apply suitable transport protocols based on specific application requirements.					
UNIT-I	Introduction				
Network Hardware, Network Software, References Models. The Physical Layer: Guided Transmission Media, Communication Satellites, The Public Switched Telephone Network – The Local Loop: Modem, ADSL, and Wireless, Trunks and Multiplexing, Switching.					
UNITII	The Data Link Layer, Access Networks, and LANs				
The Data Link Layer: Data Link Layer Design Issues, Elementary Data Link Protocols, Sliding Window Protocols. The Medium Access Control Sublayer: Multiple Access Protocols, Ethernet – Ethernet Cabling, Manchester Encoding, The Ethernet MAC Sublayer Protocol, Ethernet Performance, Switched Ethernet, Fast Ethernet. Wireless LANs – The 802.11 Protocol Stack, The 802.11 Physical Layer, The 802.11 MAC Sublayer Protocol, The 802.11 Frame Structure.					
UNIT-III	The Network Layer				
Network Layer Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Link State, and Hierarchical Routing, Broadcast Routing, Multicast Routing), Congestion Control Algorithms, Internetworking.					
UNIT-IV	The Transport Layer				
The Transport Service, Elements of Transport Protocols, The Internet Transport Protocols: UDP, TCP.					
UNIT-V	The Application Layer				
DNS – The Domain Name System, Electronic Mail, The World Wide Web. Network Security: Cryptography, Symmetric-Key Algorithms, Public-Key Algorithms, Digital Signatures.					
Textbooks:					
1. Andrew S. Tanenbaum, <i>Computer Networks</i> , 4th Edition, Pearson Education.					
Reference Books:					
1. Michael A. Gallo, William M. Hancock, <i>Computer Communications and Networking Technologies</i> , Cengage Learning. 2. Natalia Olifer, Victor Olifer, <i>Computer Networks: Principles, Technologies and Protocols for Network Design</i> , Wiley India. 3. Behrouz A. Forouzan, <i>Data Communications and Networking</i> , 4th Edition, Tata McGraw Hill.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

4. W.A. Shay, *Understanding Communications and Networks*, 3rd Edition, Cengage Learning.

Online Learning Resources

- <https://nptel.ac.in/courses/106105183/25>
- <http://www.nptelvideos.in/2012/11/computer-networks.html>
- <https://nptel.ac.in/courses/106105183/3>



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO DATA SCIENCE (Open Elective-III)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are • Introduce students to the fundamental concepts and principles of data science, including its lifecycle, methodologies, and ethical considerations. • Provide a strong foundation in statistical and mathematical concepts underlying data science techniques. • Enable students to collect, clean, transform, and prepare raw data from diverse sources, handling missing values, outliers, and inconsistencies effectively. • Develop skills to explore datasets visually and statistically to identify patterns, relationships, and anomalies, forming initial hypotheses and understanding data characteristics.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Describe the stages of a data science project, from problem definition and data acquisition to model deployment and maintenance. • Explain core statistical methods and machine learning algorithms used for data analysis and prediction. • Recognize ethical considerations, privacy concerns, and potential biases in data collection, analysis, and deployment of data-driven models. • Understand various data types (numerical, categorical, textual, time-series) and data structures, and their implications for analysis. • Apply data exploration, feature generation, selection techniques, and basic machine learning algorithms to solve real-world problems.					
UNIT-I	Introduction to Data Science				
Introduction: Definition of Data Science, Big Data and Data Science hype, overcoming hype, importance of Datafication, current landscape, required skill sets, statistical inference, populations and samples, statistical modelling, and the Data Science Process.					
UNITII	Exploratory Data Analysis and the Data Science Process				
Exploratory Data Analysis (EDA): Tools (plots, graphs, summary statistics), philosophy of EDA, Data Science Process, case study: Real Direct. Introduction to basic machine learning algorithms: Linear Regression, k-Nearest Neighbours (k-NN), k-Means.					
UNIT-III	Machine Learning Algorithms and Applications				
Motivating application: Filtering Spam. Limitations of Linear Regression and k-NN for spam filtering. Naive Bayes algorithm for spam classification. Data wrangling using APIs and web scraping tools.					
UNIT-IV	Feature Generation and Feature Selection				
Feature Generation and Selection: Extracting meaningful features from data. Application: Customer retention. Brainstorming, role of domain expertise, imagination. Feature selection algorithms: Filters, Wrappers, Decision Trees, Random Forests.					
UNIT-V	Recommendation Systems				
Building user-facing data products and recommendation engines. Dimensionality reduction techniques: Singular Value Decomposition (SVD), Principal Component Analysis (PCA). Data visualization principles, tools, and exercises to build a recommendation system. Data Visualization - Basic principles, ideas and tools for data visualization.					
Textbooks:					
1. Cathy O’Neil and Rachel Schutt, <i>Doing Data Science: Straight Talk From The Frontline</i> , O’Reilly, 2014.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Kevin P. Murphy, *Machine Learning: A Probabilistic Perspective*, 2013.
2. Foster Provost and Tom Fawcett, *Data Science for Business*, 2013.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, *Elements of Statistical Learning*, 2nd Edition, 2009.
4. Avrim Blum, John Hopcroft, Ravindran Kannan, *Foundations of Data Science*.
5. Mohammed J. Zaki, Wagner Miera Jr., *Data Mining and Analysis*, Cambridge University Press, 2014.
6. Jiawei Han, Micheline Kamber, Jian Pei, *Data Mining: Concepts and Techniques*, 3rd Edition, 2011



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO QUANTUM COMPUTING (Professional Elective-V)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The objectives of this course are - Understand the fundamentals of quantum mechanics, including superposition, entanglement, and quantum measurement. - Comprehend the principles of quantum information and how information is encoded and manipulated in quantum systems. - Familiarize with quantum gates and circuits, including constructing and analyzing basic quantum circuits. - Analyze and understand key quantum algorithms such as Deutsch-Jozsa, Shor's, and Grover's, along with their underlying principles and advantages.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: - Explain core concepts of quantum mechanics relevant to quantum computation. - Describe and apply various quantum gates to construct simple quantum circuits. - Implement and simulate basic quantum algorithms using quantum programming tools. - Analyze the computational complexity and potential speedup of quantum algorithms compared to classical algorithms.					
UNIT-I	Foundation				
Overview of traditional computing: Church-Turing thesis, circuit model of computation, reversible computation. Introduction to quantum physics and computation: Dirac notation, Hilbert spaces, dual vectors, operators, spectral theorem, functions of operators, tensor products, and Schmidt decomposition theorem.					
UNIT-II	Qubits and Quantum Model of Computation				
Quantum states: Time evolution of closed systems, composite systems, measurement, mixed states, and general quantum operations. Quantum circuit model: Quantum gates, universal sets of quantum gates, unitary transformations, and construction of quantum circuits.					
UNIT-III	Quantum Algorithms – I				
Superdense coding, quantum teleportation, applications of teleportation, probabilistic vs. quantum algorithms, phase kick-back. Key algorithms: Deutsch algorithm, Deutsch-Jozsa algorithm, Simon's algorithm, quantum phase estimation, quantum Fourier transform, eigenvalue estimation.					
UNIT-IV	Quantum Algorithms – II				
Order-finding problem and approaches, Shor's algorithm for order finding, discrete logarithms, hidden subgroup problems. Grover's quantum search algorithm, amplitude amplification, quantum amplitude estimation, quantum counting, and searching without knowing the success probability.					
UNIT-V	Quantum Computational Complexity and Error Correction				
Computational complexity: Black-box model, lower bounds for searching, general black-box lower bounds, polynomial method, block sensitivity, adversary methods. Classical error correction: Three-bit code, fault tolerance. Quantum error correction: Three- and nine-qubit codes, fault-tolerant quantum computation					
Textbooks:					
2. P. Kaye, R. Laflamme, and M. Mosca, <i>An Introduction to Quantum Computing</i> , Oxford University Press, 1999.					
Reference Books:					
2. V. Sahni, <i>Quantum Computing</i> , Tata McGraw-Hill Publishing Company, 2007.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	FUNDAMENTALS OF OPERATING SYSTEMS (Open Elective Course-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The course is designed to • Understand basic concepts and functions of operating systems Understand the processes, threads and scheduling algorithms. • Provide good insight on various memory management techniques • Expose the students with different techniques of handling deadlocks • Explore the concept of filesystem and its implementation issues • Familiarize with the basics of Linux operating system • Implement various schemes for achieving system protection and security					
Course Outcomes (CO):					
After completion of the course, students will be able to • Demonstrate and understand of computer systems and operating systems functions • Develop reliable software • Distinguish between process and thread and classify scheduling algorithms • Solve synchronization and deadlock problems • Compare various memory management schemes • Explain file systems concepts and i/o management					
UNIT - I	Operating Systems Overview				
Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.					
UNIT - II	Process Concept				
Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples. Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.					
UNIT - III	Memory-Management Strategies:				
Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.					
UNIT - IV	Memory-Management Strategies:				
Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention. File Systems: Files, Directories, File system implementation, management and optimization. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.					
UNIT - V	System Protection				
System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights. System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification. Case Studies: Linux, Microsoft Windows.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Textbooks:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
1. 2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Inter-process Communication and File systems.)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGrawHill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Online Learning Resources:

<https://nptel.ac.in/courses/106/106/106106144/>
<http://peterindia.net/OperatingSystems.html>



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	FUNDAMENTALS OF CLOUD COMPUTING (Open Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The course is designed to: - Develop a comprehensive understanding of cloud computing fundamentals and service models. - Introduce students to various cloud architectures and underlying technologies. - Explore strategies for cost management, scalability, and resource optimization in the cloud environment. - Enable students to plan and execute cloud migration effectively and securely.					
Course Outcomes (CO):					
After successful completion of the course, students will be able to: - Explain and differentiate among cloud service models, deployment types, and architectures. - Design and develop scalable, fault-tolerant, and secure cloud-based solutions. - Deploy, monitor, and manage applications on major cloud platforms such as AWS, Azure, and Google Cloud. - Implement cloud security practices and cost-optimization techniques for enterprise solutions.					
UNIT - I	The Evolution of Cloud Computing				
Introduction: What Is the Cloud? The Emergence of Cloud Computing, The Global Nature of the Cloud, Cloud-Based Service Offerings, Grid Computing or Cloud Computing?, Is the Cloud Model Reliable?, Benefits of Using a Cloud Model, What About Legal Issues When Using Cloud Models?, What Are the Key Characteristics of Cloud Computing?, Challenges for the Cloud. The Evolution of Cloud Computing: Hardware Evolution, Internet Software Evolution, Server Virtualization.					
UNIT - II	Web Services Delivered from the Cloud				
Web Services Delivered from the Cloud: Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a-Service (MaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Building Cloud Networks: The Evolution from the MSP Model to Cloud Computing and Software-as-a-Service, The Cloud Data Center, Collaboration, Service-Oriented Architectures as a Step Toward Cloud Computing, Basic Approach to a Data Center-Based SOA.					
UNIT - III	Federation, Presence, Identity, and Privacy in the Cloud				
Federation, Presence, Identity, and Privacy in the Cloud: Federation in the cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information Systems, Security in the Cloud: Cloud security challenges - Software-as-a-service security.					
UNIT - IV	Common Standards in Cloud Computing				
Common Standards in Cloud Computing: The open cloud consortium, The distributed management task force, Standards for application developers, Standards for messaging, Standards for security.					
UNIT - V	Cloud Computing Case Studies				
Cloud Computing Case Studies: Google App Engine, Google Web Toolkit, Microsoft Azure Services Platform, Windows Live, Exchange Online, SharePoint Services, Microsoft Dynamics CRM, Amazon EC2, Amazon Simple DB, Amazon S3, Amazon Cloud Front, Amazon SQS.					
Textbooks:					
- Cloud Computing implementation, management and security by John W. Ruttinghouse, James F. Ransome. CRC Press, Taylor & Francis group, 2010. - Cloud Computing a practical approach by Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. Tata McGraw Hill edition, 2010.					
Reference Books:					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

1. Cloud Application Architectures by George Reese. Oreilly publishers
2. Cloud computing and SOA convergence in your enterprise, by David S. Linthicum, Addison-Wesley



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	INTRODUCTION TO MACHINE LEARNING (Open Elective-IV)	L	T	P	C
		3	0	0	3
IV Year I Semester					
Course Objectives:					
The course is introduced for students to					
1. Understand the foundational concepts and principles of Machine Learning, including supervised, unsupervised, and reinforcement learning.					
2. Analyze and apply different machine learning algorithms for classification, regression, clustering, and pattern recognition.					
3. Evaluate the performance of learning models using statistical metrics, cross-validation, and experimental techniques.					
4. Apply dimensionality reduction and feature engineering techniques to improve model efficiency and accuracy.					
5. Design, implement, and deploy machine learning solutions for real-world problems using programming tools and frameworks.					
Course Outcomes (CO):					
After completion of the course, students will be able to					
1. Identify suitable machine learning techniques for a given problem and select appropriate algorithms.					
2. Implement and evaluate supervised, unsupervised, and reinforcement learning models effectively.					
3. Apply dimensionality reduction, feature selection, and preprocessing techniques to enhance learning models.					
4. Analyze and interpret model performance using relevant evaluation metrics and statistical measures.					
5. Design and develop end-to-end machine learning applications for real-world datasets and scenarios.					
6. Demonstrate proficiency in using machine learning tools, libraries, and frameworks for practical problem solving					
UNIT - I	Definition of learning systems				
Introduction: Definition of learning systems, Goals and applications of machine learning, Aspects of developing a learning system: training data, concept representation, function approximation.					
Inductive Classification: The concept learning task, Concept learning as search through a hypothesis space, General-to-specific ordering of hypotheses, Finding maximally specific hypotheses, Version spaces and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bias.					
UNIT - II	Decision Tree Learning				
Decision Tree Learning: Representing concepts as decision trees, Recursive induction of decision trees, Picking the best splitting attribute: entropy and information gain, searching for simple trees and computational complexity, Occam's razor, Overfitting, noisy data, and pruning.					
Experimental Evaluation of Learning Algorithms: Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.					
UNIT - III	Computational Learning Theory				
Computational Learning Theory: Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.					
Rule Learning: Propositional and First-Order, Translating decision trees into rules, Heuristic rule induction using separate and conquer and information gain, First-order Horn-clause induction (Inductive Logic Programming) and Foil, Learning recursive rules, Inverse resolution, Golem, and Progol.					
UNIT - IV	Artificial Neural Networks				



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Artificial Neural Networks: Neurons and biological motivation, Linear threshold units. Perceptrons: representational limitation and gradient descent training, Multilayer networks and backpropagation, Hidden layers and constructing intermediate, distributed representations. Overfitting, learning network structure, recurrent networks.

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

UNIT - V Bayesian Learning

Bayesian Learning: Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies.

Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm. Case-based learning.

Textbooks:

- 1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.
- 2) Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Books:

1. Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2. Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3. Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, O'Reilly.

Online Learning Resources:

1. Andrew Ng, Machine Learning <https://www.deeplearning.ai/machine-learning-yearning/>
2. Shai Shalev-Shwartz, Shai Ben-David, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press
<https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>
3. NPTEL Courses: <http://nptel.ac.in/courses/106106139/>



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	MOBILE APPLICATION DEVELOPMENT (Skill Enhancement Course)	L	T	P	C
		0	1	2	2
IV Year I Semester					
Course Objectives:					
• Learn the configuration of Android Studio, SDK Manager, and AVD Emulators • Understand Android UI Components and make use of Material Design for Android • Learn the usage of Libraries, APIs and handle messages • Explore various Hybrid App Development Platforms • Acquire the knowledge of app releases and publishing and app to the play store					
Course Outcomes (CO):					
After completion of the course, students will be able to • Demonstrate the configuration of Android Software Development tools • Design and develop Mobile Applications using Android and Kotlin • Develop a complex android application by using apis, Libraries, and message handling techniques • Construct the mobile application using a hybrid framework or SDK • Release and publish an application on Google Play Store					
Activities:					
Module 1: Android OS Architecture: Application Layer, Framework Layer, Libraries and Runtime, Hardware Abstraction Layer, and Kernel Task: Select any two Mobile Apps used in your mobile phone and note the various functionalities and their corresponding layers					
Module 2: Android Studio: Install Android Studio, SDK Manager, Configure Plugins, Android Virtual Device(AVD) Emulators Task: Install Android Studio and Configure Latest Android SDKs and Android Virtual Devices					
Module 3: Building your First Application: Understanding Activities and Intents, Activity Lifecycle and Managing State, Activities and Implicit Intents Task: Build and Run Hello World Application on the virtual Device and also test the app on your mobile phone					
Module 4: Android UI components: Text Controls, Buttons, Widgets, Layouts, Containers Task: Explore all the UI Controls and design a Student Registration Activity					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Module 5:

Material Design for Android: Material theme and widgets, Elevation shadows, Cards, Animations, Drawables

Task: Design the Student Registration Activity using Material Design for Android Components

Module 6:

Navigation: Back-button navigation, Hierarchical navigation patterns, Ancestral navigation (Up button), Descendant navigation, Lateral navigation with tabs and swipes

Task: Design a complete Student Management Application using Android and provide effective navigation between various Activities

Module 7:

Connect to the Internet: Security best practices for network operations, Including permissions in the manifest, Performing network operations on a worker thread, Making an HTTP connection, Parsing the results, Managing the network state

Task: Develop an Android Application that stores Student Details into the hosting server and retrieve student details from the server

Module 8:

Messages and Storage: Creating a Snackbar object, Showing the message to the user, instantiate a Toast object, Show the toast, Add Notification to your App, Customize Notifications, App-specific storage, Preferences, Room persistence library

Task: Secure the Student Management Application with proper hints, messages, notifications, and logging

Module 9:

GeoLocation: Set up the project and get an API Key, Add Markers on the map, map Styles, Enable location tracking

Task: Add your college location on maps and also provide a location tracking feature in your app

Module 10:

Authentication: Add Firebase to the project, Email Authentication, Phone Authentication, Gmail Authentication

Task: Design and implement an effective student Login System with OTP feature and email authentication using firebase

Module 11:

Hybrid App Development: Hybrid App vs Native App, React-Native, Flutter, Ionic, Xamarin

Task: Design Student Management App using any one of the Hybrid Frameworks or SDKs.

Module 12:



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Publish App to Play Store: Add a launcher icon and Application ID, Specify API Level targets and version number, Disable logging and debugging, Generate signed APK for release, Create a Google Developer Account, Run pre-launch reports, Review criteria for publishing, Submit your app for publishing.

Task: Prepare and Publish Your Android Apps in Google Play Store

References:

1. Smyth, Neil. Android Studio 4.2 Development Essentials - Kotlin Edition: Developing Android Apps Using Android Studio 4.2, Kotlin, and Android Jetpack, Payload Media, Incorporated, 2021.
2. Cheng, Fu. Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development. Germany, Apress, 2018.
3. Derks, Roy, and Boduch, Adam. React and React Native: A Complete Hands-on Guide to Modern Web and Mobile Development with React.js, 3rd Edition. United Kingdom, Packt Publishing, 2020.



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Course Code	PROMPT ENGINEERING (Audit Course)	L	T	P	C
		2	0	0	-
IV Year I Semester					
Course Objectives:					
• To provide foundational knowledge of prompt engineering and its evolution in shaping AI model behavior. • To explore strategies for crafting effective prompts across various use cases in NLP and ML. • To develop analytical skills for evaluating model outputs, bias detection, and robustness testing. • To enable learners to optimize and refine prompts for improved AI performance. • To promote ethical practices and responsible AI usage through effective prompting techniques.					
Course Outcomes (CO):					
After completion of the course, students will be able to • Understand the fundamentals and evolution of prompt engineering. • Gain the ability to craft effective closed-ended, open-ended, and role-based prompts. • Learn to probe and stress-test AI models for bias and robustness. • Apply prompt optimization techniques and performance evaluation methods. • Mitigate bias and promote ethical prompting practices in NLP and ML systems.					
Activities:					
Module 1: Introduction to Prompt Engineering • Lesson 1: Foundations of Prompt Engineering ◦ Overview of prompt engineering and its significance in NLP and ML. ◦ Historical context and evolution of prompt-based approaches.					
Module 2: Types of Prompts and Their Applications • Lesson 2: Closed-Ended Prompts ◦ Understanding and creating prompts for specific answers. ◦ Applications in question- answering systems. • Lesson 3: Open-Ended Prompts ◦ Crafting prompts for creative responses. ◦ Applications in language generation models.					
Module 3: Strategies for Effective Prompting • Lesson 4: Probing Prompts ◦ Designing prompts to reveal model biases. ◦ Ethical considerations in using probing prompts. • Lesson 5: Adversarial Prompts ◦ Creating prompts to stress-test models. ◦ Enhancing robustness through adversarial prompting.					
Module 4: Fine-Tuning and Optimizing with Prompts • Lesson 6: Fine-Tuning Models with Prompts ◦ Techniques for incorporating prompts during model training. ◦ Balancing prompt influence and generalization.					



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

- Lesson 7: Optimizing Prompt Selection
 - Methods for selecting optimal prompts for specific tasks.
 - Customizing prompts based on model behavior.

Module 5: Evaluation and Bias Mitigation

- Lesson 8: Evaluating Prompt Performance
 - Metrics and methodologies for assessing model performance with prompts.
 - Interpreting and analyzing results.
- Lesson 9: Bias Mitigation in Prompt Engineering
 - Strategies to identify and address biases introduced by prompts.
 - Ensuring fairness and inclusivity in prompt-based models.

Module 6: Real-World Applications and Case Studies

- Lesson 10: Case Studies in Prompt Engineering
- Exploration of successful implementations and challenges in real-world scenarios.

Guest lectures from industry experts sharing their experiences

Textbooks:

1. "Prompt Engineering in Action" – Danny D. Sullivan
2. "The Art of Prompt Engineering with Chat GPT: A Hands-On Guide" – Nathan Hunter.

Reference Books:

1. "Prompt Engineering in Practice" – Michael F. Lewis
2. "Mastering AI Prompt Engineering: The Ultimate Guide for Chat GPT Users" – Adriano Damiao
3. "Writing AI Prompts For Dummies" – Stephanie Diamond and Jeffrey Allan
4. "Prompt Engineering Guide" (Online Resource) – promptingguide.ai

Online Resource link :

<https://www.udemy.com/course/understanding-prompt-engineering/?couponCode=NVDINCTA35TRT>



Sri Krishnadevaraya University
College of Engineering & Technology Ananthapuramu – 515 003 (A.P) India
Computer Science and Engineering

Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science and Engineering					
IV Year II Semester					
S.No	Course Code	Course Name	Category	L-T-P	Credits
1.		Internship	PR	-	4
2.		Project	PR	-	8
Total					12

Category	CREDITS
Internship	4
Project work	8
TOTAL CREDITS	12



Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science					
Honors in CSE					
S.No.	CourseCode	Course Name	Category	L-T-P	Credits
1.		Quantum Computing	PC	3-0-0	3
2.		No SQL Database	PC	3-0-0	3
3.		Randomized Algorithms	PC	3-0-0	3
4.		Algorithm for Intelligent Systems	PC	3-0-0	3
5.		Cloud Security	PC	3-0-0	3
6.		No SQL Lab	PC	0-0-3	1.5
7.		Quantum and Cloud Computing Lab	PC	0-0-3	1.5
Total					18





Course Code	NO SQL DATABASE		L	T	P	C
			3	0	0	3
Honors						
Course Objectives:						
To enable students to • Discuss the history unstructured data • To know non- relational databases and their importance in Data science. • Understand the differences between Relational and No SQL databases • To explore the several types of No SQL data bases and understand the role in Big Data.						
Course Outcomes (CO):						
At the end of the course, the students will be able to: • Understand basics of quantum computing • Understand physical implementation of Qubit • Understand Quantum algorithms and their implementation • Understand The Impact of Quantum Computing on Cryptography						
UNIT-I	Overview and history of No SQL Data bases					
Definition of the four types of No SQL data bases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of No SQL, Key Points.						
UNIT-II	RDBMS Vs No SQL					
Comparison of relational databases to new No SQL stores, Mongo DB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges No SQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, Map Reduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.						
UNIT-III	Document Data bases					
No-SQL Key-Value Databases using Mongo DB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.						
UNIT-IV	Column Oriented Databases					
Column-oriented No SQL databases using Apache HBASE, Column-oriented No SQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.						
UNIT-V	Key Value Data bases					
No SQL Key-Value databases using Riak, Key-Value Data bases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted No SQL Database, Graph No SQL databases using Neo4j, No SQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.						
Textbooks:						
1.Sadalage, P. & Fowler, No SQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1 st Edition 2019.						
Reference Books:						



1. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the No SQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC. ISBN-13: 978-1934356920 ISBN-10: 1934356921
2. Guy Harrison, Next Generation Database: No SQL and big data, Apress.



Course Code	RANDOMIZED ALGORITHMS	L	T	P	C
		3	0	0	3
Honors					
Course Objectives:					
To introduce the power of randomization in the design of algorithms					
Course Outcomes (CO):					
At the end of the course, the students will be able to:					
- Appreciate the fundamentals of randomized algorithm design, - Understand the fundamentals of Markov chains and the Monte Carlo method, - Apply high probability analysis to selected randomized algorithms, - Understand the Fingerprint and Pattern Matching techniques					
UNIT-I					
Introduction, A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence Game-Theoretic Techniques: Game Tree Evaluation, The Minimax Principle					
UNIT-II					
Algebraic Techniques: Fingerprinting and Freivald’s Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching.					
UNIT-III					
Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.					
UNIT-IV					
Data Structures: The Fundamental of Data-structures, Random Treaps, Skip Lists, Hash Tables Graph Algorithms: All Pairs Shortest Path, The Min- Cut Problem, Minimum Spanning Trees					
UNIT-V					
Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, HalfSpace Intersections, Dalaunay Triangulations, Trapezoidal Decompositions, Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings					
Textbooks:					
1, Randomized Algorithms: Rajeev Motwani, Prabhakar Raghavan, Cambridge University Press, 2, Probability and Computing: Randomization and Probabilistic Techniques in Algorithms and 3, Data Analysis by Eli Upfal and Michael Mitzenmacher,					



Course Code	ALGORITHM FOR INTELLIGENT SYSTEMS	L	T	P	C
		3	0	0	3
Honors					
Course Objectives:					
The main objective of this course is to become familiar with principles of AI towards problem solving, inference, perception, and learning.					
Course Outcomes (CO):					
At the end of the course, the students will be able to:					
- Understand the history of artificial intelligence (AI) and its foundations. - Understand new and promising methods using in AI, including evolutionary computation. - Understand the specifics of various methods of artificial intelligence and their application in intelligent agents, control systems, artificial neural networks and other AI models. - Formalize real-world problems, select, and apply relevant AI models in projects that require inferences, perceptions, problem solving, intelligent control, and training. - Conduct scientific discussions on AI, its current scope and limitations, as well as social implications.					
UNIT-I					
INTRODUCTION: Course overview- Intelligent System: Core terms and definitions, Artificial Intelligence: applications, benefits and challenges, Artificial general intelligence (AGI).					
UNIT-II					
FUZZY LOGIC: Biological analogues, Applications, Basic elements of fuzzy systems, Fuzzification, Fuzzy inference.					
UNIT-III					
ARTIFICIAL NEURAL NETWORKS (ANN): Biological analogues, ANN structures, Basic units, Network topology.					
UNIT-IV					
ANN TRAINING ALGORITHMS: Supervised learning, Gradient methods, Reinforcement learning, Unsupervised learning, Deep Learning.					
UNIT-V					
INTELLIGENT AGENT: Structure and architecture of agents, Classification, Applications, Cooperative Sensing and Tracking, Particle swarm optimisation (PSO), Ant colony optimisation (ACO), Multi-Agent Systems.					
CASE STUDY: Case Study on Training Algorithms.					
Textbooks:					
1, SS, V, C., & Hareendran, A, (2014), Artificial intelligence and machine learning, PHI Learning Pvt, Ltd.					
2, Timothy J, Ross (2017), Fuzzy Logic with Engineering Applications, Fourth edition, 2017.					
Reference Books:					
1, Bishop, C, M, (2014), Pattern recognition and machine learning, Springer.					
2, Rothman, D, (2018), Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases, Packt Publishing Ltd.					



Course Code	CLOUD SECURITY		L	T	P	C
			3	0	0	3
Honors						
Course Objectives:						
Pre- requisites: Computer Networks, Cryptography and Network Security, Cloud Computing. The course is designed to						
- Understand the cloud security and privacy issues. - Familiarize with the Threat Model and Cloud Attacks. - Understand the Data Security and Storage. - Analyze Security Management in the Cloud						
Course Outcomes (CO):						
At the end of the course, the students will be able to:						
- Distinguish the various cloud security and privacy issues. - Analyze the various threats and Attack tools. - Describe the Data Security and Storage. - Analyze the Security Management in the Cloud						
UNIT-I	Overview of Cloud Computing					
Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models, Cloud Deployment Models, Cloud Service Platforms, Challenges Ahead. Introduction to Cloud Security: Introduction, Cloud Security Concepts, CSA Cloud Reference Model, NIST Cloud Reference Model, NIST Cloud Reference Model.						
UNIT-II	Cloud Security and Privacy Issues					
Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud. Infrastructure Security: The Network Level, the Host Level, the Application Level, SaaS Application Security, PaaS Application Security, IaaS Application Security.						
UNIT-III	Threat Model and Cloud Attacks					
Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios, A Taxonomy of Attacks, Attack Tools-Network-level attack tools, VM-level attack tools, VMM attack tools, Security Tools, VMM security tools.						
UNIT-IV	Data Security and Storage					
Information Security Basic Concepts, an Example of a Security Attack, Cloud Software Security Requirements, Rising Security Threats. Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security.						
UNIT-V	Security Management in the Cloud					
Evolution of Security Considerations, Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for Security Issues with Cloud Computing, Side Channel Security Attacks in the Cloud. Security Management in the Cloud- Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management.						
Textbooks:						
- Preeti Mishra, Emmanuel S Pilli, Jaipur R C Joshi Graphic Era., “Cloud Security Attacks, Techniques, Tools, and Challenges”, 1st Edition, 2022, CRC press. - Tim Mather, SubraKumaraswamy, and ShahedLati“Cloud Security and Privacy”,1st Edition, 2019, O'Reilly Media, Inc.						



Reference Books:

1. Naresh Kumar Sehgal Pramod Chandra, P. Bhatt John M. Acken., “Cloud Computing with Security Concepts and Practices”, 2nd Edition Springer nature Switzerland AG 2020.
2. Essentials of Cloud Computing by K. Chandrasekaran Special Indian Edition CRC press.
3. Raj kumar Buyya, “Cloud Computing Principles and Paradigms”, John Wiley.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc19_cs64/preview
- <https://archive.nptel.ac.in/courses/106/105/106105167/>
-



Course Code	NO SQL LAB	L	T	P	C
		0	0	3	1.5
Honors					
Course Outcomes(CO):					
• Upon successful completion of the course, the student will be able to: • Installing and configuring MongoDB in windows • Perform all database operations using MongoDB • Develop applications by integrating MongoDB with java/PHP.					
List of Experiments:					
1.Mongo DB installation and configuration in windows. 2.Demonstrate how to create and drop a database in Mongo DB. 3.Creating the Collection in Mongo DB on the fly 4.Creating collection with options before inserting the documents and drop the collection created. 5.Mongo DB insert document a. Insert single document b. Insert multiple documents in collection 6.Querying all the documents in json format and Querying based on the criteria. 7.Mongo DB update document a. Using update() method. b. Using save() method. 8.MongoDB delete document from a collection. a. Using remove() method. b. Remove only one document matching your criteria c. Remove all documents 9. Mongo DB Projection 10. limit() ,skip(), sort() methods in Mongo DB 11. Mongo DB indexing a. Create index in Mongo DB b. Finding the indexes in a collection c. Drop indexes in a collection d. Drop all the indexes 12. Mongo DB with java and PHP a. Create a simple application that uses Mongo DB with Java b. Create a simple application that uses Mongo DB with PHP					



Course Code	QUANTUM & CLOUD COMPUTING LAB	L	T	P	C
		0	0	3	1.5
Honors					
Course Objectives					
This course aims to: 1. Introduce fundamental quantum computing concepts such as qubits, superposition, and quantum gates using Qiskit. 2. Develop an understanding of quantum algorithms through practical implementation, including Deutsch's algorithm. 3. Provide hands-on experience in cloud computing by simulating cloud environments, VM allocation, and scheduling policies. 4. Analyze cloud resource management techniques such as load balancing and deployment models. 5. Explore cloud security challenges by simulating cyber threats like Denial of Service (DoS) attacks.					
Course Outcomes(CO):					
By the end of this course, students will be able to: 1. Implement and compare classical and quantum bits using Qiskit. 2. Design and analyze quantum circuits using logic gates and linear algebra principles. 3. Simulate and evaluate cloud computing infrastructures including data centers, VM allocation, and scheduling policies. 4. Apply resource provisioning techniques to optimize cloud performance and load balancing. 5. Assess cloud security threats by implementing and analyzing DoS attack simulations.					
List of Experiments:					
Quantum Computing Lab: 1. Simulating Classical vs Quantum Bits - o Implement classical bits and qubits using Qiskit. - o Compare bit flip vs quantum superposition using Hadamard gates. 2. Quantum Logic Gates Implementation - o Implement and visualize basic quantum gates (X, Y, Z, H, S, T). - o Apply these gates to single and multiple qubits. 3. Linear Algebra in Quantum Computing • Represent quantum states using matrices and vectors. • Perform matrix operations (addition, multiplication, tensor product). 4. Deutsch's Algorithm Implementation • Demonstrate quantum parallelism using Deutsch's algorithm. Compare results with classical computation.					
Cloud Computing Lab: 1. Simulation of a Simple Cloud Data Center: Create a cloud environment with multiple Hosts, Virtual Machines (VMs), and Cloudlets. 2. VM Allocation and Scheduling Policies: Implement and compare Time-Shared and Space-Shared VM allocation policies. 3. Resource Provisioning and Load Balancing : Simulate dynamic resource allocation for better load balancing. 4. Cloudlet Scheduling Algorithms: Implement and compare FCFS (First-Come-First-Serve), Round Robin, and Priority-Based Scheduling.					



5. Performance Analysis of Cloud Deployment Models : Simulate and compare Public, Private, Hybrid, and Community Cloud environments.
6. Simulating Denial of Service (DoS) Attacks: Implement a scenario where multiple requests overload a cloud server.

TEXT BOOKS:

1. Shashank Tiwari, Professional No SQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
2. Pramod Sadalage and Martin Fowler, No SQL Distilled, Addison-Wesley Professional, 2012.

REFERENCE BOOKS:

1. Dan McCreary and Ann Kelly, Making Sense of No SQL, Manning Publications, 2013.
2. Gaurav Vaish, Getting Started with No SQL, Packt Publishing



Sri Krishnadevaraya University College of Engineering & Technology					
Dept. of Computer Science					
Minors in CSE					
S.No.	CourseCode	Course Name	Category	L-T-P	Credits
1.		Data Science for Engineers	PC	3-0-0	3
2.		Introduction To AI/ML	PC	3-0-0	3
3.		Software Engineering	PC	3-0-0	3
4.		Design and Analysis of Algorithms	PC	3-0-0	3
5.		Computer Networks	PC	3-0-0	3
6.		Artificial Intelligence and Machine Learning Laboratory	PC	0-0-3	1.5
7.		Computer Networks Lab	PC	0-0-3	1.5



Course Code	DATA SCIENCE FOR ENGINEERS	L	T	P	C
		3	0	0	3
Minors					
Course Objectives:					
• Learn concepts, techniques and tools they need to deal with various facets of data science • practice, including data collection and integration • Understand the basic types of data and basic statistics					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Understand basic terms of statistical modeling and data science • Implementation of R programming concepts • utilize R elements for data visualization and prediction • Identify the importance of data reduction and data visualization techniques					
UNIT-I					
Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication- Current landscape of perspectives - Statistical Inference - Populations and samples – Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.					
UNIT-II					
Data Types & Statistical Description Types of Data: Attributes and Measurement, Attribute, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.					
UNIT-III					
Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub etting, Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, sub setting of Data Frames, Extending Data Frames, Sorting Data Frames. Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating ListElements, Merging Lists, Converting Lists to Vectors					
UNIT-IV					
Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.					
UNIT-V					
Charts and Graphs: Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot. Regression: Linear Regression Analysis, Multiple Linear regression					
Textbooks:					



1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
2. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

Reference Books:

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.
3. Brian S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
4. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5. Paul Teetor, "R Cookbook", O'Reilly, 2011.



Course Code	INTRODUCTION TO AI/ML	L	T	P	C
		3	0	0	3
Minors					
Course Objectives:					
- AI programming focuses on three cognitive skills learning, reasoning and self-correction. - AI is a research field that studies how to realize the intelligent human behaviors on a computer. - Understand the basic theory underlying machine learning. - Formulate machine learning problems corresponding to different applications.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: CO1: Solve basic AI based problems. CO2: Define the concept of Artificial Intelligence. CO3: Apply AI techniques to real-world problems to develop intelligent systems. CO4: Identify machine learning techniques suitable for a given problem. CO5: Solve the real world problems using various machine learning techniques.					
UNIT-I					
Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication- Current landscape of perspectives - Statistical Inference - Populations and samples – Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.					
UNIT-II					
Solving Problems by searching Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.					
UNIT-III					
Reinforcement Learning Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.					
UNIT-IV					
Introduction Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.					
UNIT-V					
Neural networks and genetic Algorithms Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.					
Textbooks:					
1. Stuart J. Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3rd Edition, Pearson Education, 2019.					



2. T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.
3. EthernAlpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
4. Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.



Course Code	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3
Minors					
Course Objectives:					
The objectives of this course are to introduce Software life cycle models, Software requirements and SRS document. Project Planning, quality control and ensuring good quality software. Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance • Analyse various software engineering models and apply methods for design and development of software projects. • Develop system designs using appropriate techniques. • Understand various testing techniques for a software project. • Apply standards, CASE tools and techniques for engineering software projects					
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.					
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.

Textbooks:

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

Reference Books:

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

Online Resources

- 1) <https://nptel.ac.in/courses/106/105/106105182/> 2)
- 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview3
- 3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview.



Course Code	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3
Minors					
Course Objectives:					
- To analyze the asymptotic performance of algorithms. - To understand the write rigorous correctness proofs for algorithms. - To familiarity with major algorithms and data structures. - Apply important algorithmic design paradigms and methods of analysis. - Synthesize efficient algorithms in common engineering design situations.					
Course Outcomes (CO):					
At the end of the course, the students will be able to: CO1: Explain the basic concepts of time and space complexity CO2: Explain the basic concepts of divide-and-conquer Strategy, dynamics programming's Greedy and Algorithm CO4: Describe the methodologies of how to analyze the following applications by Dynamics Programming Algorithm. CO6: Discuss the concept of graph coloring and back tracking CO7: Analyze the performance of algorithms					
UNIT-I					
Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis. Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and biconnected components.					
UNIT-II					
Dynamic Programming General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.					
UNIT-III					
Dynamic Programming General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.					
UNIT-IV					
Backtracking General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.					
UNIT-V					
Branch and Bound 108 General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.					
Textbooks:					
- Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Universities Press - The Algorithm Design Manual, 2nd edition, Steven S. Skiena, spinger Introduction to Algorithms, second edition, T.H Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt.Ltd.					



Reference Books:

1. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, PEA
2. Design and Analysis of Algorithms, Pearson Education Parag Himanshu Dave, Himansu Dave, HimansuBalachandra Dave
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc GrawHill.
4. Design and Analysis of algorithms, Pearson education, Aho, Ullman and Hopcroft.

Online Resources

- 4) <https://nptel.ac.in/courses/106/105/106105182/> 2)
- 5) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview3
- 6) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview.



Course Code	COMPUTER NETWORKS		L	T	P	C
			3	0	0	3
Minors						
Course Objectives:						
The course is designed to - Understand the basic concepts of Computer Networks. - Introduce the layered approach for design of computer networks - Expose the network protocols used in Internet environment - Explain the format of headers of IP, TCP and UDP - Familiarize with the applications of Internet - Elucidate the design issues for a computer network						
Course Outcomes (CO):						
At the end of the course, the students will be able to: - Identify the software and hardware components of a computer network - Design software for a computer network - Develop new routing, and congestion control algorithms - Assess critically the existing routing protocols - Explain the functionality of each layer of a computer network - Choose the appropriate transport protocol based on the application requirements						
UNIT-I						
Computer Networks and the Internet, What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks, Reference Models, Example Networks, Guided Transmission Media, Wireless Transmission.						
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.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 Request.						
UNIT-III						
The Network Layer: Routing Algorithms, Internetworking, The Network Layer in The Internet.						
UNIT-IV						
The Transport Layer, Connectionless Transport: UDP The Internet Transport Protocols: TCP, Congestion Control.						
UNIT-V						
Principles of Network Applications, 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.						
Textbooks:						
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.						



Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, “Networks for Computer Scientists and Engineers”, Oxford Publishers, 2016.

Online Learning Resources:

1. <https://nptel.ac.in/courses/106105183/25>
2. <http://www.nptelvideos.in/2012/11/computer-networks.html>
3. <https://nptel.ac.in/courses/106105183/3>



Course Code	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY	L	T	P	C
		0	0	3	1.5
Minors					
Course Objectives:					
The course is designed to • To learn to implement uninformed and informed search techniques. • To build a knowledge base in Prolog and process queries to perform inference. • To build supervised learning models. • To explore the regression models. • To learn to compare and evaluate the performance of different models					
Course Outcomes (CO):					
At the end of the course, the students will be able to: • At the end of this course, the students will be able to: • CO1: Implement uninformed and informed search techniques. • CO2: Build a knowledge base in Prolog and process queries to perform inference. • CO3: Develop supervised learning models. • CO4: Develop regression models. • CO5: Compare and evaluate the performance of different models					
LIST OF EXPERIMENTS:					
1. BFS & DFS algorithm implementation					
2. A* algorithm implementation					
3. Hill Climbing implementation					
4. Develop a small KB using Prolog and answer simple queries.					
5. Inference through Prolog/Python.					
6. Write a program to implement the naïve Bayesian classifier for credit card analysis and compute the accuracy with a few test data sets.					
7. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.					
8. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.					
9. Evaluate the performance of Linear regression, logistic regression, naïve Bayes and SVM based prediction models for heart disease diagnosis.					
.					



Course Code	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	3	1.5
Minors					
Course Objectives:					
Course Objectives: • To understand the different types of networks • To discuss the software and hardware components of a network • To enlighten the working of networking commands supported by operating system • To impart knowledge of Network simulator 2/3 • To familiarize the use of networking functionality supported by JAVA • To familiarize with computer networking tools.					
Course Outcomes (CO):					
After completion of the course, students will be able to • Design scripts for Wired network simulation • Design scripts of static and mobile wireless networks simulation • Analyze the data traffic using tools • Design JAVA programs for client-server communication • Construct a wired and wireless network using the real hardware					
LIST OF EXPERIMENTS:					
1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables. - Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports. - Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation. 2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup 3. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network. 4. Use Packet tracer software to build network topology and configure using Distance vector routing protocol. 5. Use Packet tracer software to build network topology and configure using Link State routing protocol. 6. Using JAVA RMI Write a program to implement Basic Calculator 7. Implement a Chatting application using JAVA TCP and UDP sockets. 8. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round-trip time to the neighbour. Implement Hello and Echo commands using JAVA. 9. Using Wire shark perform the following operations: -Inspect HTTP Traffic - .Inspect HTTP Traffic from a Given IP Address, - Inspect HTTP Traffic to a Given IP Address, - Reject Packets to Given IP Address, - Monitor Apache and My SQL Network Traffic.					



10. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
11. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
12. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

References:

1. Shivendra S.Panwar, Shiwen Mao, Jeong- dong Ryoo, and Yihan Li, “TCP/IP Essentials A Lab-Based Approach”, Cambridge University Press, 2004.
2. Cisco Networking Academy, “CCNA1 and CCNA2 Companion Guide”, Cisco Networking Academy Program, 3rd edition, 2003.
3. Elloitte Rusty Harold, “Java Network Programming”, 3rd edition, O’REILLY, 2011.

Online Learning Resources/Virtual Labs:

- <https://www.netacad.com/courses/packet-tracer>- Cisco Packet Tracer.
- Ns Manual, Available at: <https://www.isi.edu/nsnam/ns/ns-documentation.html>, 2011.
- https://www.wireshark.org/docs/wsug_html_chunked/-Wireshark.
- <https://nptel.ac.in/courses/106105183/25>
- <http://www.nptelvideos.in/2012/11/computer-networks.html>
- <https://nptel.ac.in/courses/106105183/3>
- http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php



		L	T	P	C
		0	0	0	1.5



Sri Krishnadevaraya University
College of Engineering & Technology, Ananthapuramu – 515 003
(A.P) India

R23 Regulations