ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

ACADEMIC REGULATIONS (R20), COURSE STRUCTURE AND SYLLABI

For the students admitted to

B. Tech., Regular Four Year Artificial Intelligence and Data Science Degree Programme from the Academic Year 2020-21, B.Tech Honors and Minors

and

B. Tech., Lateral Entry Scheme from the Academic Year 2021-22

VISION AND MISSION OF THE INSTITUTION

Vision

We impart futuristic technical education and instil high patterns of discipline through our dedicated staff who set global standards, making our students technologically superior and ethically strong, who in turn shall improve the quality of life of the human race.

Mission

Our mission is to educate students from the local and rural areas and from other states so that they become enlightened individuals, improving the living standards of their families, industry and society. We provide individual attention, world-class quality of Technical education and take care of character building.

ACADEMIC RULES AND REGULATIONS OF FOUR-YEAR B. TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE REGULAR DEGREE PROGRAMME

APPLICABLE FOR THE STUDENT BATCHES ADMITTED FROM THE ACADEMIC YEAR 2020-21

APPLICABLE FOR THE STUDENTS (Lateral Entry) ADMITTED FROM THE ACADEMIC YEAR 2021-22

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1. PREAMBLE

Annamacharya Institute of Technology and Sciences (Autonomous), Rajampet, relentlessly aims to achieve academic excellence by implementing new initiatives in teaching-learning and evaluation processes. Based on the directions of the University Grants Commission (UGC), New Delhi, All India Council for Technical Education (AICTE), New Delhi and Jawaharlal Nehru Technological University Anantapur (JNTUA) Anantapuramu, the institute adopted AICTE and APSCHE model curriculum, with minor modifications to match the needs, expectations, and skillsets of students of the region, in both the under- graduate and post-graduate programmes offered from the academic year 2020-21.

2. APPLICATION AND COMMENCEMENT

- The regulations are quite comprehensive and include definitions of key terms, semester system, credit system, grading system and other relevant details.
- The regulations detailed herein shall apply to all the regular under-graduate programmes offered by the Institute.
- The regulations shall be applicable and come into force to the student batches admitted from the academic year 2020-21 and Lateral Entry students admitted from the academic year 2021-22
- The Institute may revise, amend or change the regulations, scheme of examinations and syllabi, from time to time, if found necessary and on approval by the Academic Council of the Institute, keeping the recommendations of the BoS in view.
- Any or all such amendments shall be effective from such date and to such batches of students including those already undergoing the programme, as may be approved through Academic Council of the Institute.
- These regulations shall be called R20 Regulations.

3. ELIGIBILITY FOR ADMISSION

3.1 ADMISSION INTO ENGINEERING UNDER GRADUATION PROGRAMMES (REGULAR)

The eligibility criteria for admission into engineering under graduate programmes offered at AITS shall be as prescribed by the Government of Andhra Pradesh. The criteria are given below:

- The candidate shall be an Indian National / NRI.
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted.
- The candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission recognized by Board of Intermediate, Andhra Pradesh.
- Seats in each programme in the Institute are classified into two categories i.e., **Category – A** and **Category – B** as per the GOs of Andhra Pradesh.

Category – A Seats

These seats shall be filled through counselling as per the rank secured by a candidate in the Common Entrance Test (EAMCET) conducted by the Government of Andhra Pradesh and as per other admission criteria laid down in the GOs.

Category – B Seats

These seats shall be filled by the Institute as per the GOs issued by the Government of Andhra Pradesh from time to time

3.2 ADMISSION INTO SECOND YEAR (Lateral Entry Scheme)

A candidate shall be admitted into the third semester (II year I semester) based on the rank secured by the candidate in the Engineering Common Entrance Test (ECET) by the Government of Andhra Pradesh and as per other admission criteria laid down in the GOs.

4. Medium of Instruction

The medium of instruction shall be **English** for all the courses including their content delivery and examinations, seminars, presentations and project evaluation as prescribed in the programme curriculum.

5. B.TECH. PROGRAMME STRUCTURE

The structure of the B.Tech. Programmes on offer at AITS are based on the **Choice Based Credit System (CBCS)** as defined by the UGC and the curriculum / course structure as suggested by the AICTE and APSCHE in its Model Curriculum.

Semester Scheme

- The B. Tech Programmes offered at AITS follow **semester scheme** pattern.
- The duration of a B. Tech. Programme shall be of **4 academic** years for 4 year B. Tech programmes **and 3 academic years** for 3 year B. Tech programmes in lateral entry scheme**.**
- Each academic year shall have **2 semesters** i.e., odd and even semesters and shall be counted as first semester, second semester, and third semester and so on up to eighth semester.
- Each semester shall consist of **16 weeks** of academic work excluding internal examinations.
- Each semester is structured to provide credits totalling to **160 credits** for the entire B.Tech. Programme.
- Each semester shall have **Continuous Internal Evaluation (CIE)** and **Semester End Examination (SEE)** for both Theory and Lab courses.
- Each student is required to secure a total of **160 credits with a CGPA ≥ 5** for the completion of the UG programme and the award of the B.Tech. Degree.
- A student after securing admission into a 4 year B.Tech Programme at AITS shall pursue and acquire the B.Tech. degree in a **minimum period of four academic years i.e., 8 semesters** and a **maximum period of eight academic years i.e., 16 semesters** starting from the date of commencement of I year I

semester, failing which the student shall forfeit the seat in B.Tech. Programme.

- A student after securing admission into a 3 year B. Tech Programme (Lateral Entry) at AITS shall pursue and acquire the B.Tech. Degree in a **minimum period of three academic years i.e., 6 semesters** and a **maximum period of six academic years i.e., 12 semesters** starting from the date of commencement of II year I semester, failing which the student shall forfeit the seat in B.Tech. programme

6. PROGRAMMES OFFERED BY THE INSTITUTE

The following B. Tech. programmes are offered as specializations by the Institute from 2020-2021.

SNo	Name of the Program	Programme Code
1	Civil Engineering	01
2	Electrical and Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics and Communication Engineering	04
5	Computer Sciences and Engineering	05
6	Artificial Intelligence and Data Science	30
7	Artificial Intelligence and Machine Learning	-

7. COURSES AND CREDIT STRUCTURE

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

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

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

Each course is assigned certain number of credits based on following criterion

Type of Class	Semester	
	Periods per Week	Credits
Theory (Lecture/Tutorial)	01	01
	02	02
	03	03
	04	04
Practical	02	01
	03	1.5
	04	02
Project Work / Internship	-	16.5

Every course of the B. Tech. programme shall be offered by a specific section / department. The unique codes of the section / department offering the courses are given in the Table.

Course offering Department	Code
Basic Science Courses	C
Humanities and Social Science Courses including Management Courses	
Civil Engineering	1
Electrical and Electronics Engineering	2
Mechanical Engineering	3
Electronics & Communication Engineering	4
Computer Science & Engineering	5
Artificial Intelligence and Data Science	30
Artificial Intelligence and Machine Learning	-

Every B. Tech. Programme of study shall be designed to have theory and laboratory courses. In addition, a student shall carry out internship, project, socially relevant project, and other mandatory courses as prescribed in the curriculum of the Programmes.

7.1 Types of Courses:

TYPE OF COURSES	COURSE CATEGORY	CODE	DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
Foundation	Engineering Sciences	ESC	24
	Basic Sciences	BSC	21
	Humanities & Social Sciences and Management	HSMC	10.5
Core	Professional Core	PCC	51
Project	Project (12)	PROJ	16.5
	Internship (4.5)		
Elective courses	Professional Elective	PEC	15
	Open Elective (including two MOOCs)	OEC	12
Mandatory Courses	Mandatory	MC	-
Skill Oriented Courses		SC	10
Total Credits			160

7.1.1 Foundation Courses

Engineering Science courses, Basic Science Courses and Humanities courses are termed as Foundation Courses and are mostly offered at I and II Year.

7.1.2 Professional Core Courses

Professional Core Course is to be completed by all students of respective programme before they can move on to the next semester.

7.1.3 Professional Core Electives

University Grants Commission has come up with the Choice Based Credit System (CBCS) in which the students have a choice to choose from the prescribed courses, which are referred as Professional elective and Open Elective courses. All the Professional and Open elective courses shall be offered for 3 credits.

Students have to register for a total of 5 professional core electives courses (PEC-1 to PEC-5) from the list of track-wise professional elective course as prescribed in the course structure of the programme. The following points are considered for a Professional Elective Course.

- Maximum strength of a class /section for each semester shall be 72.
- A course may be offered to the students, only if a minimum of 24 students (1/3 of the section strength) opt for it.
- The selection of course based on the choice for students shall be on 'first come first serve' through on line and off line registration.
- The Head of the department or concerned shall decide, whether or not to offer such course keeping in view the resources available in the department offering the course.

7.1.4 Open Electives

Choice Based Credit System (CBCS) is promoted in such a way that different open elective courses should be offered by every department in engineering to other departments. This interdisciplinary of learning open elective courses by other department students will have learning awareness and job-oriented benefits. Students require the opportunity to choose any open elective course from different departments and apply their knowledge to acquire jobs in that field of course. Learning and employment benefits are not only through their own course subjects but also through open elective courses.

Every student shall earn prescribed credits by choosing one of the open elective courses from the list of Open Electives given in the Curriculum. Further students from a particular program/branch can opt for one Open Elective (OEC1) offered by their concerned department. However, one Open Electives (OEC2) is inter-disciplinary and shall be offered by other branches.

Two Open electives (OEC3 & OEC4) are to be chosen from the repository of **inter-disciplinary MOOCs** courses offered by NPTEL or any other recognized Institutions/Organization. Students shall consult their class mentors before opting for an open elective course (MOOCs)

The following guidelines are pertaining to Open Elective Courses.

- Maximum strength of a class /section for each semester shall be 72.
- A course may be offered to the students, only if a minimum of 24 students (1/3 of the section strength) opt for it. The minimum number of students is required to register the course to offer opted course in the department.
- The selection of course based on the choice for students shall be on 'first come first serve' through on line and off line registration.
- The Head of the department or concerned shall decide, whether or not to offer such course keeping in view the resources available in the department offering the course.

7.1.5 Massive Open Online Courses as Open Elective

- MOOCs (Massive Open Online Courses) are introduced to meet with the global requirements and to inculcate the habit of self-learning and in compliance with the UGC guidelines
- A student shall be permitted to pursue up to a maximum of two electives courses under MOOCs during programme. Each of courses must be of minimum 12 weeks in duration.
- Concerned departments **shall declare the list of inter-disciplinary** courses that a student can pursue through MOOCs at the beginning of the corresponding semester.
- Students interested in pursuing MOOCs shall register for the course and submit this information at their department office at the start of the corresponding semester.
- Course content for the selected MOOCs shall be drawn from the respective MOOCs offering Portal.
- Course progress shall be monitored by the Mentors designated by the HoD.
- Grade obtained through the evaluation of the MOOC shall be considered for the CGPA calculation.
- Three credits shall be awarded to the student upon successful completion of MOOC.
- In case a student fails to complete the MOOCs he/she shall re-register for the same with the same provider, already offered that course. In case that provider discontinues to offer the course, Institution shall conduct an offline examination in the same format, which student already appeared in online examination, as per the MOOC syllabus.

7.1.6 Skill Oriented Courses

- There shall be 5 skill oriented course offered during 3rd to 7th semester. Among the 5 skill oriented courses, 4 courses shall focus on the basic advanced skills related to the domain courses and remaining 1 shall be a soft skills course.
- Skill oriented / skill advanced courses carry 2 credits
- For skill oriented/skill advanced course, 1 theory and 2 practical hours may be allotted as per the decision of concerned BOS.

- Out of the 5 skill courses 2 shall be skill-oriented courses from the same domain and shall be completed in 2nd year. Of the remaining 3 skills course, 1 shall be necessarily be a soft skill course and the remaining 2 shall be skill advanced courses either from the same domain or job oriented skill course, which can be of inter-disciplinary nature.
- A pool of interdisciplinary job-oriented skill course shall be designed by a common Board of studies by the participating departments and the syllabus along with the pre-requisites shall be prepared for each of the laboratory infrastructure requirements,
- The student shall be given an option to choose either the skill courses being offered by the institute or to choose a certificate course being offered by Industries/Professional Bodies/ APSSDC or any other accredited bodies as approved by the concerned BOS.
- If a student chooses to take a certificate course offered by Industries/Professional Bodies/ APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the department, the credits shall be awarded to the student upon producing the course completion certificate from Industries/Professional Bodies/ APSSDC as approved by the concerned BOS.
- 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 oriented course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned BOS, the student is deemed to have fulfilled the attendance requirements of the course and acquire the credits assigned to the course.
- A committee shall be formed at the level of the institute to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. The recommended conversions and appropriate grades/marks are to be approved by the Academic Council

7.1.7 Mandatory Courses

- A student shall pursue mandatory courses as specified in the course structure of the B.Tech. Programme.
- These courses are among the compulsory courses and do not carry any credits.
- A student has to secure 40 marks out of 100 in the Internal Examination, shall be necessary requirement for the student to qualify for the **award of Degree**.
- Result of mandatory courses shall be declared with **"Pass"** or **"Fail"** performance in the Comprehensive Marks Memo.
- No marks or letter grade shall be allotted.
- Attendance in the mandatory course shall be considered while calculating aggregate attendance.

7.1.8 Universal Human Values (UHV) Courses

- Universal Human Values-I shall be offered during the Student Induction Programme with no credits.
- Universal Human Values-II course carries 3 credits. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.
- A student has to secure 40% marks out of 100 in the CIE and SEE together to qualify for the award of the degree. The distribution shall be 50 marks for continuous internal assessment and 50 marks for semester end examination.
- Internal evaluation shall be conducted for the course during semester and shall be evaluated for 50 marks and distributions of marks as follows:
    - Assessment by faculty mentor: 10 marks
    - Self-assessment: 10 marks
    - Assessment by peers: 10 marks
    - Socially relevant project/Group Activities/Assignments: 20 marks

8. Evaluation Process

The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks for both Theory and Lab Course.

- For a Theory course, the distribution shall be 30 marks for Internal Evaluation and 70 marks for End-Examinations. The distribution is detailed in 8.1.1.
- For a Lab course, the distribution shall be 30 marks for Internal Evaluation and 70 marks End-Examinations. The distribution is detailed in 8.1.3
- Project Work shall be evaluated for 200 marks. Mandatory courses with no credits shall be evaluated for 100 marks.

8.1 Internal Evaluation

For a Theory Course, 30 marks are allotted for Internal Evaluation. Two Internal examinations (Theory Internal Examinations) shall be conducted for a Theory Course during a semester and they shall be evaluated for 30 marks of which 25 marks are given for Internal Examination and 5 marks for assignment. For Lab Course, there shall be a continuous internal evaluation during the semester for 30 marks.

8.1.1 Theory Internal Examinations

Theory internal examination shall have Part A & Part B. In Part A, which is compulsory, five short answer questions each of which carries one mark. There shall be no sub-questions or bits or fill-up the blanks. The examination shall be conducted for 2 hours.

Part B shall contain three either type questions (Total six questions from 1 to 6). Each question shall carry 10 marks. 30 marks allotted for Part B shall finally be scaled down to 20 marks. The questions shall be set/ moderated such that the student can comfortably answer each question within the stipulated time.

Question paper pattern for Internal Examination (25 Marks) shall be as follows:

PART A: Five short answer questions - 5 x 1 = 5 Marks

PART B: 30 Marks (will be scaled to 20 marks)

(i) There shall be three questions with internal Choice i.e., 'either' or 'choice'

(ii) The student shall answer three questions

First Theory Internal examination shall be conducted as per the syllabus of I & II units. The second internal examination shall be conducted as per the syllabus of III, IV and V units. 80 % weightage for the best performance and 20 % the other shall be considered.

For Example:

Marks obtained in I Internal examination: 19

Marks obtained in II Internal examination: 10

Final Internal Marks: (19x0.8) + (10x0.2) = 17.2

If the student is absent for any one Internal examination, the final internal marks shall be arrived at by considering 80% weight age to the marks secured by the student in the appeared examination and zero to the other.

For Example:

Marks obtained in first Internal: 0 (Absent); Marks obtained in second Internal: 18

Final Internal Marks: (18x0.8) + (0x0.2) = 14.4

Note: For some courses namely, Engineering Graphics and Engineering Graphics & Design, the distribution of internal evaluation and external evaluation marks shall be 30 and 70 respectively.

Of the 30 internal evaluation marks, day-to-day performance of the student shall be evaluated for 20 marks and internal examination carries 10 marks. Day-to-day work shall be evaluated by the teacher concerned based on the exercises/submissions/assignments prepared in the class. Two internal examinations shall be conducted in a semester for duration of 2 hours each for 10 marks with a weightage of 80% for better of the two and 20% for the other. The sum of day-to-day work and the internal examination marks will be the final internal evaluation for 30 marks for the subject. End examination shall be for 70 marks and is of 3 hours

duration. The question paper shall be with 5 questions, one question from each unit with internal choice. All questions carry 14 marks each.

8.1.2 Assignment (Theory)

The assignment shall contain essay type questions/numerical problems etc.., the assignments is given by the concerned class teacher for five marks from first two units. The second assignments shall give from rest of the syllabus. The first assignment should be submitted before the conduct of the first internal examination, and the second assignment should be submitted before the conduct of the second internal examination. There shall be at least two assignments in a semester and performance of one best out of two assignments to be considered.

8.1.3 Lab Internal Evaluation

Out of the 30 marks allotted for Lab Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 20 marks by the concerned laboratory teacher based on experimental evaluation/record/viva. Two Lab Internal examinations shall be conducted for 10 marks by the concerned teacher. Performance of one best out of two tests to be considered.

8.1.4 Internal Evaluation of Mandatory Courses

Mandatory courses are offered with no credits. However, a student has to complete Mandatory Courses in order to be eligible for the award of the Degree. There shall be an Internal Examination for 100 marks. A student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examination. In case, the student fails, a supplementary examination shall be conducted.

8.1.5 Make-up Internal Evaluation

The student who has missed both the Theory Internal examinations will be permitted to appear for a Make-up Internal examination in the event of his/her producing satisfactory evidences of medical ailment. One Make-up internal test shall be conducted immediately after the II Internal examination in the same semester, covering the total syllabus of FIVE Units in the respective course.

This Make-up examination will be given a weightage of 80%. Make-up tests shall be conducted outside the working hours and there can be even two such examinations on a day.

Student absent for I Internal examinations with valid reasons he/ she should produce a supporting document to the department within a week after completion of last internal examination. And the same student absent for same subject in II Internal examination, he/ she should produce a supporting document to the department immediately in order to giving the provision for makeup examination.

Make-up internal examinations are not for improvement of marks in Theory Internal examinations. There shall be no make-up internal examinations for a Lab course.

8.1.6 Evaluation of Skill oriented / Skill advanced / Soft Skills course

Course type: Laboratory

Distribution of marks: 30:70

Evaluation Type: Internal Evaluation

A student is evaluated for a maximum of 100 marks with respect to skill oriented course / Skill advanced courses / Soft skill course. The distribution of marks shall be 30 for internal evaluation and 70 for external evaluation. For Internal Evaluation, day-to-day performance of the student in the laboratory shall be evaluated for 30 marks by the concerned skill oriented course / Skill advanced courses / Soft skill course class teacher based on experimental evaluation / discussions / results / reports. External evaluation is done for 70 marks in a laboratory end semester examination conducted for 3 hours.

Note: Each skill oriented course / Skill advanced courses / Soft skill course will have its own evaluation procedure and weightage.

8.2 End Evaluation

8.2.1 Theory End Evaluation

As specified in 8.0, Theory End Evaluation is done for 70 marks. End examination of theory subjects shall be conducted at the end of semester. There shall be Regular and Supplementary End Examinations. Theory End Examination shall be conducted for 70 marks and is of 3 hours duration.

Theory end examination shall have Part A & Part B. In Part A, which is compulsory, five short answer questions each unit of which carries two marks shall be given. There shall be no sub-questions or bits or fill-up the blanks.

Part B shall contain five either type questions (Total 10 questions with internal choice). 60 marks allotted for Part B and each question shall carry 12 marks. There will be one question from each unit. The examination shall be conducted for 3 hours.

Question paper pattern for Semester End Examination (70 Marks) shall be as follows:

PART A: 5 x 2 = 10 Marks

(i) There shall be one question from each unit

(ii) Part A is compulsory.

PART B: 5 x 12 = 60 Marks

(i) Five questions with internal choice will be given

(ii) There shall be one question from each unit with Internal Choice i.e., ‘either’ or ‘choice’

(iii) Sub questions may also be given.

8.2.2 Lab End Examination

As specified in 8.0, Lab End Evaluation is done for 70 marks, in the form a Lab End Examination that shall be conducted for 3 hours in respective Laboratory. Each lab course will have its own evaluation procedure and weightage.

8.2.3 Supplementary Theory/Lab End Examinations

- Supplementary examination shall be conducted along with regular semester end examinations.
- During Semester End Examinations of even semester, supplementary examinations of odd semester shall be conducted and during semester end examinations of odd semester, supplementary examinations of even semester shall be conducted.
- The same schedule is applicable to Supplementary Lab End Examinations. Supplementary examination shall be conducted along with the next batch of students or separately.
- Advanced supplementary shall be conducted only for Final Year II semester Students in view of their higher education pursuits and placement opportunities.
- In case of seminars and comprehensive viva-voce examinations, supplementary seminar / comprehensive viva-voce will be conducted along with the next batch of students. If the next batch of students is not available, a separate supplementary examination will be conducted.

8.2.4 Challenge Evaluation, Revaluation and Recounting

Students may visit Examination Section Webpage for Norms and Procedures for Challenge Evaluation, Revaluation and Recounting of Answer Scripts. (Refer to Appendix II).

9.0 Internship and Project Evaluation

9.1 Summer Internship / Research Internship (Industry / Govt. / NGO / MSME / Online)

- A student shall carry a mandatory Internship for 2 months for 1.5 credits in 2nd year 2nd semester during summer vacation and it is evaluated during 3rd year 1st semester. A student shall carry a mandatory Industrial / Research Internship for 2 months for 3 credits in 3rd year 2nd semester during summer vacation and it is evaluated during 4th year 1st semester.
- Two summer internships each with a minimum of 6 weeks duration. Done at the end of 2nd and 3rd year, respectively are mandatory. The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs
- 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 departments and appear for an oral presentation before the departmental committee. The report and the oral presentation shall carry 40% and 60% weightages respectively.

- In the final semester, the student should mandatorily undergo internships and parallelly he/she should work on a project with well-defined objectives. At the end of the semester the candidates shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.
- The institute 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.
- There shall also be mandatory full internship in the final semester of the programme along with the project work.
- For other details, please refer to Appendix I.

9.2 Project Work

Project work consists of a presentation of **Abstract of the main project** in the beginning of 8th Semester. After selecting specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. Project shall be evaluated for a total of 200 marks. The technical presentation/report shall be evaluated by a committee consisting of Head of the Department along with two senior faculty members of the Department. A student shall acquire 12 credits assigned, if her/his report is declared Satisfactory by the committee based on Rubrics set by the Department for evaluation.

Out of a total of 200 marks for the **Project work,** The internal evaluation shall be carried for 50 marks done by a committee consisting of HOD, Project Supervisor and senior faculty member of the department and the remaining 150 marks shall be awarded by a committee consisting of HOD, project Supervisor and an External Examiner nominated by the Principal or Dean Academics. The internal evaluation shall be done on the basis of two seminars conducted in a semester as per the academic calendar and stipulated rubrics. In case, if a student fails in Project work, a re-examination shall be conducted within a month. In case he/she fails in the re-examination also, he/she shall not be permitted register for viva voce examination. Further such students shall re-appear as and when next year 8th semester supplementary examinations are conducted.

10. Curricular Framework for Honors Programme

- Students of a Department/ Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline
- A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of 2nd

semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.

- Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/ she will be awarded B.Tech (honors) in Mechanical Engineering.
- In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B.Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
- Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.
- It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
- The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component. (Model pool list is enclosed in the end of the syllabus)
- MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC Courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the Academies Council.

- The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech Programmes for the requirement of B.Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
- If a student drops or is terminated from the Honors programme, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
- In case student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with honors and they will receive regular B.Tech degree only, however, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- Honors must be completed simultaneously with a major degree Programme. A student cannot earn Honors after he/she has already earned bachelor's degree.

11. Curricular Framework for Minor Programme

- a) Students who are desirous of pursuing their special interest areas other than the choses discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, if Mechanical Engineering student select subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering.

  b) Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine Learning track etc.
- The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance/demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc., or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric Vehicles, and VLSI etc.,
- The list of disciplines / branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.

- There shall be no limit on the number of programs offered under Minor. The Institute can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the Programme.
- The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- A student shall be permitted to register for Minors Programme at the beginning of 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA up to the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA up to 3rd semester or failed in any of the courses, his/her registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.
- A student shall earn additional 20 credits in the specified area to be eligible for the award of B.Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits).
- Out of the 20 credits, 16 credits shall be earned by undergoing specified course listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
- In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is pass/fail course without any grades, the grade to be assigned as decided by the Academic Council.
- Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.

- A committee should be formed at the level of Institute / Department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committees should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.
- If a student drops (or terminated) from the Minor Programme, they cannot convert the earned credits into free or core electives, they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following:
    - All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Miner will be shown in the transcript.
- In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/ she will be dropped from the list of students eligible for degree with Minors and they will receive B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- Minor must be completed simultaneously with a major degree Programme. A student cannot earn the Minor after he/she has already earned bachelor's degree.

12. Attendance Requirements and Detention Policy

- A student shall maintain a minimum required attendance of 40 % in each subject and 75 % in AGGREGATE of all the subjects in a semester.
- Shortage of attendance up to 10 % i.e., attendance between 65 % to 75 % in aggregate, may be condoned by the Institute Academic Committee based on the rules prescribed by the Academic Council of the Institute from time to time.
- A stipulated fee shall be payable towards condonation of shortage of attendance.
- Shortage of attendance below 65 % shall in no case be condoned. A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system

  1st Slab: Less than 75 % attendance but equal to or greater than 70 % a normal condonation fee can be collected from the student.

  2nd Slab: Less than 70 % but equal to or greater than 65 %, double the condonation fee can be collected from the student.
- Students whose shortage of attendance is not condoned OR who have not paid the stipulated fee OR who have not cleared any other due to the Institute in any semester are not eligible to write the Semester End Examination (SEE).

- Students, who do not meet the minimum required attendance of 65% in a semester, shall be detained in that semester and their registration for that semester shall stand cancelled. They shall not be promoted to the next semester.
- Students detained in a semester shall seek re-admission into that semester as and when offered.
- Academic regulations applicable to the semester in which re-admission is sought shall be applicable to the re-admitted student.
- In case, there are any professional electives and /or open electives, the same may also be re-registered, if offered. However, if those electives are not offered in the later semesters, then alternate electives may be chosen from the same set of elective courses offered under that category.

  Any student against whom any disciplinary action is pending shall not be permitted to attend semester end examination (SEE) in that semester.

13. Minimum Academic Requirements and Award of the Degree

The following Academic Requirements have to be satisfied in addition to the attendance requirements mentioned in section 10.

13.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory and lab courses, and project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the total of the internal and end examination marks taken together. In case of mandatory courses, he/she shall secure 40% of the total marks.

13.2 A student admitted in 4 year B. Tech programme, shall be promoted from 4th to 5th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from I year I and II-Semesters, II year I and II-Semesters examinations conducted till that time. A student admitted in 3 year B. Tech programme, shall be promoted from 4th to 5th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from II year I and II-Semesters examinations conducted till that time.

13.3. A student admitted in 4 year B. Tech programme, shall be promoted from 6th to 7th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from I year I & II-Semesters, II year I & II-Semesters and III year I & II-Semesters examinations conducted till that time.

A student admitted in 3 year B. Tech programme, shall be promoted from 6th to 7th Semester only if he/she fulfills the academic requirements of securing a minimum of 50% credits from II year I & II-Semesters and III year I & II-Semesters examinations conducted till that time. And in case a student is detained for want of credits for particular academic year by sections 11.2 and 11.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the 5th semester or 7th semester as the case may be.

13.4 A student shall register and put up minimum academic requirement of all 160 credits and earn all 160 credits for the award of B. Tech degree

13.5 Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

14. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The performances of students in each of the courses in the Programme are expressed in terms of letter grades based on an absolute grading system. We use 10-point grading system with letter grades. They are given in the following table.

Marks Obtained	Letter Grade	Description	Grade Points (GP)
≥90	A+	Outstanding	10
≥80 and ≤89.99	A	Excellent	9
≥70 and ≤79.99	B	Very Good	8
≥60 and ≤69.99	C	Good	7
≥50 and ≤59.99	D	Average	6
≥40 and ≤49.99	E	Pass	5
<40	F	Fail	--
Absent in the exam(s)	Ab	Absent	--

A student is eligible for the award of the B.Tech. Degree with the class as mentioned in the following table

CGPA	Class
≥7.5	First class with Distinction
≥6.5 and <7.5	First Class
≥5.5 and <6.5	Second Class
≥5.0 and <5.5	Pass

For mandatory courses, student shall be awarded “pass” or “fail “without any credit. This shall not be counted for the computation of SGPA/CGPA

14.1 Computation of SGPA

The performance of each student at the end of each semester shall be indicated in terms of SGPA. The SGPA shall be calculated as follows:

$$SGPA = \frac{Total\ earned\ weighted\ grade\ points\ in\ a\ semester}{Total\ credits\ in\ a\ semester}$$

$$SGPA = \frac{\sum_{i=1}^{p} C_{i.}.G_i}{\sum_{i=1}^{p} C_i}$$

Where

$C_{i.}$ = Number of credits allotted to a particular curse 'i'

G_i= Grade point corresponding to the letter grade awarded to the course i

$i = 1,2,\ldots$.p represent the number of courses in a particular semester.

Note: SGPA is calculated and awarded to those students who pass all the courses in a semester.

14.2 Computation of CGPA

The performance of a student shall be obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained on all courses during the course of study

$$CGPA = \frac{Total\ earned\ weighted\ grade\ points\ for\ the\ entire\ programme}{Total\ credits\ for\ the\ entire\ program}$$

$$CGPA = \frac{\sum_{j=1}^{m} C_{j.}.G_j}{\sum_{j=1}^{m} C_j}$$

Where

$C_{j.}$ = Number of credits allotted to a particular semester 'j'

G_j = Grade point corresponding to the letter grade awarded to the semester j

$j = 1,2,\ldots$.m represent the number of semester of the entire programme.

14.3 Grade Card

The grade card issued shall contain the following

- The credits for each course offered in that semester
- The letter grade and grade point awarded in each course
- The SGPA and CGPA
- Total number of credits earned by the student up to the end of that semester

Example: - Computation /calculation of SGPA

Course name	Credits (C)	Letter grade	Grade point (GP)	Credit point (CP=C*GP)
Course 1	4	A	9	4x9=36
Course 2	3	A+	10	3*10=30
Course 3	2.5	A+	10	2.5*10=25
Course 4	1.5	C	6	1.5*6=9
Course 5	1	D	5	1*5=5
Total	12			105

Therefore, SGPA= $\frac{105}{12}$ 8.75

Example Illustration of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
Credit: 20 SGPA : 8.75	Credit : 20 SGPA : 8.25	Credit : 22 SGPA : 7.89	Credit: 23 SGPA : 8.21	Credit : 22 SGPA : 7.86

Thus, CGPA = $\frac{20*8.75+20*8.75+22*7.89+23*8.21+22*7.86}{107} = 8.34$

Similarly, compute CGPA obtained at the end of 8th semester shall be the final CGPA secured by the student for the entire programme.

14.4 Conversion of SGPA into percentage

In case of a specific query by students/employers regarding Semester Grade Point Average (SGPA)/ Cumulative Grade Point Average (CGPA) into percentage, the following formulae will be adopted for notional conversion of CGPA into percentage.

Percentage = (CGPA - 0.50) * 10

14. Transcripts

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

16. 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.

17. Readmission of Students

A student who has satisfied the minimum attendance requirement in any semester may repeat that semester, after obtaining written permission from the Principal and cancelling the previous record of attendance and academic performance (viz; internal evaluation and external evaluation marks) of the semester or year. This facility may be availed by any student at the maximum twice for a 4 year B. Tech, and only once by Lateral Entry student & PG student during the entire course of study.

18. Minimum Instruction Days for a Semester

The minimum instruction days including exams for each semester shall be 16 weeks.

19. Student transfers

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

20. Announcement of results

- Results review committee comprising of University nominee, Principal, Dean Academics, Chairmen of various boards of studies, Controller of Examinations and Deputy Controller of Examinations will monitor the results and gives the permission for announcement of results.
- After review meeting results are loaded in to Institution website from which students can access their results by entering Hall Ticket number. And also results in form of hard copy are available with respective Heads of the departments.

21. General Instructions:

- The academic regulations should be read as a whole for purpose of any interpretation.
- Malpractices rules-nature and punishments are appended.
- Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal/ Governing body is final.
- Any legal issues are to be resolved in Rajampet Jurisdiction.
- The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the Institute.

Appendix-I: Internship Guidelines

The Head of the Department will arrange internship for students in industries/organization after fifth semester or as per AICTE/ affiliating University guidelines. Institutions may also device online system for arranging &managing internships. The general procedure for arranging internship is given below:

Step 1: Request Letter/ Email from the office of HOD of the department should go to industry to allot various slots of 4-6 weeks during summer vacation as internship periods for the students. Students request letter/profile/ interest areas may be submitted to industries for their willingness for providing the training.

Step 2: Industry will confirm the training slots and the number of seats allocated for internships via Confirmation Letter/ Email. In case the students arrange the training themselves the confirmation letter will be submitted by the students in the office of Training & Placement through concerned department. Based on the number of slots agreed to by the Industry.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training at the concerned Industry / Organization. In-between Faculty Member(s) evaluate(s) the performance of students once/twice by visiting the Industry/Organization and Evaluation Report of the students is submitted in department office/TPO with the consent of Industry persons/ Trainers.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry.

Step 7: List of students who have completed their internship successfully will be issued by concerned Department.

For more details refer:

https://www.aicte-india.org/sites/default/files/AICTE%20Internship%20Policy.pdf

Appendix II: Norms and Procedures for Challenge Evaluation/Revaluation/Recounting

Revaluation / Recounting:

- The students who wishes to apply for Revaluation/Recounting of his/her answer-books(s) must submit his/her application on the prescribed from together with the requisite fee to the Controller of Examinations before expiry of 15 days excluding the date of the declaration of his/her examination result. Application not received in the prescribed form or by the due date or without the requisite fee shall be rejected.
- After Recounting / Revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a notice.
- No Revaluation / Recounting for Laboratory Examination.
- The students are informed to be more careful in furnishing the information while applying for Recounting / Revaluation. The applications with insufficient information will be summarily rejected and the student has to forfeit the amount paid in this connection.

Challenge valuation:

- Applications are invited from the students, who wish to apply for Challenge Valuation in the subjects of the B.Tech Regular and Supplementary examinations
- The student will apply for Challenge valuation in a specified application and should be routed through the HOD concerned.
- The students who have applied for the revaluation for a paper(s) of an examination are only eligible for the Challenge Valuation of that paper(s) of that examination.
- A Fee of Rs. 10000/- (Ten Thousand Rupees Only) for each paper is to be paid within the last date for challenge valuation.
- A Xerox copy of the answer script will be provided to the student on receipt of the payment of fee and date and time of the valuation will be informed to the student, so that valuation will be done in the presence of the teacher attended in support of the student nominated by the HOD concerned.
- The HOD concerned will nominate a teacher of the concerned subject to observe the valuation in support of the student. This will be done on the request of the student.
- If the marks obtained in the challenge valuation are more than or equal to 15% of the maximum marks with respect to the original marks obtained in the first valuation, then the marks obtained in the Challenge valuation will be awarded to the student and the institute will pay back Rs 9,000 (Nine thousands rupees only) to the student. If the student status changes from fail to pass, an amount of Rs. 5000 will be refunded to the student. Otherwise there will not be any change in the result of the student and original marks will be retained and the student will forfeit the fee paid.
- No Challenge valuation for Laboratory Examination

APPENDIX III: Rules for Disciplinary Action for Malpractices / Improper Conduct in Examinations

Malpractices identified by squad or special invigilators or invigilators

Punishments shall be given to the students as per the above guidelines. The case is to be referred to the malpractice committee.

Malpractice committee

1. The Principal, Chairman
2. Dean, Academics, Member
3. Invigilator, Member
4. Subject expert, Member
5. Concerned Head of the Department, Member
6. Controller of Examinations, Member Secretary

Note:

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

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred for four consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for four consecutive semesters from class work and

		all University examinations, if his involvement is established. Otherwise, the candidate is debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject only.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant — Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of student of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. If the candidate physically assaults the invigilator/officer-in-charge of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10.	Possess any lethal weapon or firearm in the	Expulsion from the examination hall and cancellation of the

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

Activities (Non-Credit) as per AICTE Guidelines
List of Activities

1. Physical and Health

1.1 Physical Activities: (a) Games and Sports, (b) Gardening (c) Tree Plantation (d) Yoga:
1.2 NCC/NSS: Standard procedure

2. Culture

2.1 Learning an art form: music, dance, theatre, painting, and other art forms
2.2 Heritage: Visit to museum, archaeology sites, cultural walks, tours, local traditions
2.3 Intangible Cultural Heritage: Festivals, Food ways, Local Games

3. Literature & Media

3.1 Literature, Cinema and Media: workshop, reading multiple news sources, analyse ads
3.2 Group reading: Group sits and each person reads aloud (if possible, with proper modulation) taking turns. This if done properly for an hour one may complete 30-40 pages in an hour

4. Social Service

4.1 Social Awareness: Artisans-relates to engg., visit to hospitals, orphanages, police station, courts, trauma centres, consumer forums
4.2 Social Service: teach in neighbourhood, adopt an underprivileged school, village stay / visit (NSS), cleanliness drive, and skill transfer

5. Self-Development

5.1 Spiritual, Mindfulness & Meditation
5.2 Religion and Inter-faith: Reading of books on religious texts of different faiths by famous authors, organizing lecture on interfaith issues covering philosophies and chronology and contemporary situations world over at a given time
5.3 Human Values
5.4 Behavioural and Interpersonal skills: Motivational lectures, Group Discussions/activities, Case Study, Games/Stimulation Exercises, Role-Playing, Mindfulness training.
5.5 Lectures: Areas could be from science, engineering, social sciences, arts or even politics.

6. Nature

6.1 Nature Club: bird watching, recognizing plants at institute/at home, recognizing local animals, appreciating biodiversity
6.2 Environment Protection (non-credit course)

7. Innovation

7.1 Project based – Sc. Tech., Social, Design & Innovation: (a) Exposure to social problems (which are amenable to technological solutions) (b) Design & Innovation (to address above problems)

First 3-weeks – Induction Program will have Physical activities (*), Learning an art form (*), Literature & Cinema, Social Awareness (*) Lectures, Visits to local areas, Universal Human Values (*)

(*) It is the core part of Induction Program (Besides Familiarization to the College, Department and Branch career opportunities)

After first 3 weeks (1st semester)

Based on student interest – the above may be continued

Universal Human Values Groups – Meet once a week with 1st year students with the same faculty mentor & senior student guide.

Semester 2 to 4

Every student should register for some activity mentioned above in every semester. Spend 3-5 hours per week on the activity.

1. Environment Science (mandatory non-credit course prescribed at 1/2 semester)
2. Life Sciences for Engineers (mandatory non-credit course prescribed at 3/4 semester)
3. Constitution of India (mandatory non-credit course prescribed at 5/6 semester)
4. Essence of Indian Traditional Knowledge (mandatory non-credit course prescribed at 5/6 semester)

For mandatory non-credit courses, these will be graded as Pass or Fail (P/F). Thus, the grades obtained will not affect the grade point average. However, they will appear on the grade sheet.

Semester 5 to 8

Every student should register for some activity mentioned above in every semester. Spend 3-5 hours per week on the activity. For activities, suitable registration system in case of the semesters will be developed.

STUDENT INDUCTION PROGRAMME (Zero Semester)

Induction programme for newly admitted students is conducted in line with AICTE/UGC Induction programme policy, every year before the commencement of the first semester classes. The objective of the Induction programme is to demystify what is expected of students in Intermediate level and to provide adequate foundation in the core applied science subjects and English limited to moderate level so that students do not face any difficulty when the classes commence.

The syllabus for the course is framed in such a way that equal importance is given to both Engineering discipline and personality development which includes soft skills, sports and cultural Activities. The duration of the induction programme is **THREE** weeks. The students are trained in Foundation courses, basics of programming and English apart from other co-curricular and extra-curricular activities.

The objective of the Induction Programme is to work closely with the newly joined students in order to facilitate the following:

- Make the students feel comfortable in the new environment
- Allow them to explore their academic interests and activities
- Reduce competition and make them work for excellence
- Promote bonding within them
- Build relations between teachers and students
- Give a broader view of life
- Build character

Phase	Course Code	Name of the course	Lecture	Practical
Regular Phase	20A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	20AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	20A502	Basics of Programming and Lab	3	2
Regular Phase	20AC02	Foundation classes in Mathematics	3	0
Regular Phase	20AC03	Foundation classes in Physics	3	2
Regular Phase	20AC04	Foundation classes in Chemistry	3	2
Regular Phase	20AC05	Universal Human Values I	2	0
Regular Phase	20A301	Fundamentals of Engineering Drawing	1	0
Regular Phase	-	Physical education activities – Sports and Games	0	1
Non daily	-	Creative Arts		
Non daily	-	Lectures by eminent personalities		
Non daily	-	Visits to local area		
Non daily	-	Extra-curricular activities		

Vision and Mission of the Department

Vision

The vision of the Department of Artificial Intelligence and Data Science is to impart quality education and produce high quality, creative and ethical engineers, instill professionalism, enhance students' problem-solving skills in the domain of artificial intelligence and data science with a focus to prepare them for the industry, engage them in potential research areas, to pursue and have continued professional growth to serve the greater cause of society.

Mission

- To provide skill-based education to master the students in problem solving and analytical skills to enhance their niche expertise in the field Artificial Intelligence and Data Science.
- To educate the students with latest technologies to update their knowledge in the field of AI and Data science.
- To enable students to experience content-based learning with premier quality data science education, research, and industrial collaboration.
- To guide students in research on Artificial Intelligence and data science, with aim of having an ethical impact on society by tackling societal grand challenges.
- To impart quality and value-based education and contribute towards the innovation of computing system, data science to raise satisfaction level of all stakeholders

Department of Artificial Intelligence & Data Science

R20 B. Tech. COURSE STRUCTURE FOR ARTIFICIAL INTELLIGENCE & DATA SCIENCE

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	HSMC	20AC15T	Communicative English	3	0	0	3
2	BSC	20AC13T	Chemistry	3	0	0	3
3	BSC	20AC11T	Algebra and Calculus	3	0	0	3
4	ESC	20A511T	Problem Solving through C Programming	3	0	0	3
5	ESC(LAB)	20A314L	Engineering Workshop	0	0	3	1.5
6	ESC(LAB)	20A512L	IT Workshop	0	0	3	1.5
7	HSMC(LAB)	20AC15L	Communicative English Lab	0	0	3	1.5
8	BSC (LAB)	20AC13L	Chemistry Lab	0	0	3	1.5
9	ESC (LAB)	20A511L	Problem Solving through C Programming Lab	0	0	3	1.5
10	*MC*	*20AC16T*	*Environmental Science*	3	0	0	0
						Total Credits	**19.5**

Category	Credits
Basic Science course	7.5
Engineering Science Courses	7.5
Humanities Sciences	4.5
Total Credits	19.5

Semester II (First Year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC22T	Applied Physics	3	0	0	3
2	BSC	20AC21T	Differential Equations and Vector Calculus	3	0	0	3
3	ESC	20A223T	Basic Electrical and Electronics Engineering	3	0	0	3
4	ESC	20A324T	Engineering Drawing	2	0	2	3
5	ESC	20A521T	Data Structures through Python	3	0	0	3
6	BSC (LAB)	20AC22L	Applied Physics_Lab	0	0	3	1.5
7	ESC(LAB)	20A223L	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
8	ESC (LAB)	20A521L	Data Structures through Python Lab	0	0	3	1.5
						Total Credits	**19.5**

Category	Credits
Basic Science course	7.5
Engineering Science Courses	12
Total Credits	19.5

Department of Artificial Intelligence & Data Science

Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC33T	Discrete Mathematics	3	0	0	3
2	HSMC	20AE32T	Management Science	3	0	0	3
3	PCC	20A531T	Database Management Systems	3	0	0	3
4	PCC	20A532T	Object Oriented Programming Using Java	3	0	0	3
5	PCC	20A533T	Computer System Architecture	3	0	0	3
6	PCC (LAB)	20A531L	Database Management Systems Lab	0	0	3	1.5
7	PCC (LAB)	20A532L	Object Oriented Programming Using Java Lab	0	0	3	1.5
8	PCC(LAB)	20A533L	Computer System Architecture Lab	0	0	3	1.5
9	SC	20A3031L	Advanced Python Programming	1	0	2	2
10	MC	20AC34T	Life Sciences for Engineers	3	0	0	0
						Total credits	**21.5**

Category	Credits
Basic Science Course	3
Professional Core Courses	13.5
Humanities Sciences	3
Skill oriented Course	2
Total Credits	21.5

Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	ESC	20A445T	Microprocessor and Interfacing	3	0	0	3
2	PCC	20A541T	Design and Analysis of Algorithms	3	0	0	3
3	PCC	20A3041T	Foundations of Artificial Intelligence and Data Science	3	0	0	3
4	PCC	20A543T	Operating Systems	3	0	0	3
5	BSC	20AC41T	Probability and Statistics	3	0	0	3
6	ESC(LAB)	20A445L	Microprocessor and Interfacing Lab	0	0	3	1.5
7	PCC(LAB)	20A3041L	Artificial Intelligence and Data Science Lab	0	0	3	1.5
8	PCC(LAB)	20A3042L	Design and Analysis of Algorithms and Operating Systems Lab	0	0	3	1.5
9	SC	20A3043L	Web Programming	1	0	2	2
						Total credits	**21.5**
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Basic Science Courses	3
Professional core Courses	12
Engineering Science Courses	4.5
Skill oriented Course	2
Total Credits	21.5

Department of Artificial Intelligence & Data Science

Semester V (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A3051T	Data Warehousing and Data Mining	3	0	0	3
2	PCC	20A552T	Computer Networks	3	0	0	3
3	PCC	20A553T	Software Engineering	3	0	0	3
4	OEC	20A305AT	MOOC	2	0	2	3
5	PEC	20A305BT	Advanced Artificial Intelligence	3	0	0	3
		20A305CT	Optimization Techniques				
		20A305DT	Data Visualization Techniques				
		20A305ET	Scalable Algorithms for Data Analysis				
6	PCC(LAB)	20A3051L	Data Mining and Software Engineering Lab	0	0	3	1.5
7	PCC(LAB)	20A552L	Computer Networks Lab	0	0	3	1.5
8	SC	20A3052L	R Programming	1	0	2	2
9	MC	20AC53T	Essence of Indian Traditional Knowledge	3	0	0	0
10	Internship	20A3051I	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester	0	0	0	1.5
						Total credits	**21.5**

Category	Credits
Professional core Courses	12
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course	2
Summer Internship	1.5
Total Credits	21.5

Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A3061T	Automata and Compiler Design	3	0	0	3
2	PCC	20A3062T	Machine Learning	3	0	0	3
3	PCC	20A3063T	Big Data Analytics	3	0	0	3
4	PEC	20A306AT	Artificial Neural Networks	3	0	0	3
		20A56BT	Cryptography and Network Security				
		20A306CT	Advanced Data Mining				
		20A306DT	Natural Language Processing				
5	OEC	20A306ET	MOOC	2	0	2	3
6	PCC(LAB)	20A3061L	Automata and Compiler Design Lab	0	0	3	1.5
7	PCC(LAB)	20A3062L	Machine Learning Lab	0	0	3	1.5
8	PCC(LAB)	20A3063L	Big Data Analytics Lab	0	0	3	1.5
9	SC	20AC61L	Professional Communication	0	1	2	2
10	*MC*	*20AC62T*	*Constitution of India*	*3*	*0*	*0*	*0*
						Total credits	**21.5**

Industrial/Research Internship (Mandatory) 2 Months during summer vacation

Category	Credits
Professional core courses	13.5
Professional Elective courses	3
Open Elective Course/Job oriented elective	3
Skill advanced course/ soft skill course	2
Industrial/Research Internship (Mandatory) 2 Months	-
Total Credits	21.5

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Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PEC	20A307AT	Deep Learning	3	0	0	3
		20A307BT	Internet of Things				
		20A307CT	Information Retrieval Systems				
		20A307DT	Advanced Databases				
2	PEC	20A307ET	Computational Intelligence	3	0	0	3
		20A307FT	Robotics and Automation				
		20A307GT	Pattern Recognition				
		20A307HT	Linux Programming				
3	PEC	20A57FT	Blockchain Technology	3	0	0	3
		20A307JT	Reinforcement Learning				
		20A307KT	Cyber Security and Forensic Science				
		20A307LT	Bio-inspired Computing				
4	OEC	20A307MT	Social Media Analytics	2	0	2	3
		20A307NT	Image and Video Analytics				
		20A307OT	Software Defined Networks				
		20A57GT	Cloud Computing				
5	OEC	20A17RT	Water Resources and Harvesting	3	0	0	3
		20A17ST	Disaster Management				
		20A27RT	Energy Auditing Conservation and Management				
		20A27ST	Electric Vehicles				
		20A37RT	Optimization in Engineering				
		20A37ST	Industrial Management & Entrepreneurship				
		20A47RT	Electric Circuits & its Applications				
		20A47ST	Introduction to Communications Systems				
		20AE7AT	Human Resource Management				
		20AE7BT	Intellectual Property Rights				
6	HSMC	20AC71T	Universal Human Values-II	2	1	0	3
7	SC	20A571L	Mobile Application Development	1	0	2	2
8	Internship	20A3072I	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester	0	0	0	3
						Total credits	**23**

Category	Credits
Professional Elective courses	9
Open Elective Course	6
Humanities and Social Sciences	3
Skill advanced course/ soft skill course	2
Industrial/Research Internship	3
Total Credits	23

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Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ	20A3081P	Project work, Seminar, and Internship in Industry	-	-	-	12
Internship (6 months)							
			Total credits				**12**

TOTAL CREDITS DISTRIBUTION

S.NO	Category	AI&DS
1	BSC	21
2	MC	0
3	ESC	24
4	PCC	51
5	PEC	15
6	OEC	12
7	HSMC	10.5
8	SKILL	10
9	INTERNSHIP	4.5
10	PROJ	12
	TOTAL	**160**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Communicative English
Category HSMC
Course Code 20AC15T

Year I B. Tech.
Semester I Semester
Branch CE, ME, CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- To Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- To impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays
- To provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1 **9**

Prescribed Lesson: *On the Conduct of Life* by William Hazlitt

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.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.
Grammar and Vocabulary: Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the unit, the student will be able to

- Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information (L1)
- Ask and answer general questions on familiar topics and introduce oneself/others (L2)
- Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information (L3)
- Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs (L2)
- Form sentences using proper grammatical structures and correct word forms (L4)

Unit 2 **9**

Prescribed Lesson: *The Brook* by Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short, structured talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the unit, the student will be able to

- Comprehend short talks on general topics (L1)
- Participate in informal discussions and speak clearly on a specific topic using suitable discourse markers (L3)
- Understand the use of cohesive devices for better reading comprehension (L1)
- Write well-structured paragraphs on specific topics (L4)
- Identify basic errors of grammar/ usage and make necessary corrections in short texts (L2)

Unit 3 **9**

Prescribed Lesson: *The Death Trap* by Saki

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, Paragraph Writing, identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the unit, the student will be able to

- Comprehend short talks and summarize the content with clarity and precision (L1)
- Participate in informal discussions and report what is discussed (L3)
- Infer meanings of unfamiliar words using contextual clues (L3)
- Write summaries based on global comprehension of reading/listening texts (L4)
- Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing (L4)

Unit 4 **9**

Prescribed Lesson: *Muhammad Yunus*

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: Writing structured essays on specific topics using suitable claims and evidence.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

At the end of the unit, the student will be able to

- Infer and predict about content of spoken discourse (L2)
- Understand verbal and non-verbal features of communication and hold formal/informal conversations (L1)
- Interpret graphic elements used in academic texts (L3)
- Produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
- Use language appropriate for description and interpretation of graphical elements (L3)

Unit 5 **9**

Prescribed Lesson: *The Dancer with a White Parasol by Ranjana Deve*

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 - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Letter Writing: Official Letters/Report Writing

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

Learning Outcomes

At the end of the unit, the student will be able to

- Take notes while listening to a talk/lecture and make use of them to answer questions (L4)
- Make formal oral presentations using effective strategies (L4)
- Comprehend, discuss, and respond to academic texts orally and in writing. (L3)
- Produce a well-organized essay with adequate support and detail (L4)
- Edit short texts by correcting common errors (L3)

Prescribed Textbook:

1. Language and Life, Orient Black Swan (with CD).

Reference Books

1. English Grammar in Use: A Self Study Reference and Practice Book, Raymond Murphy, Fourth Edition, Cambridge Publications
2. English Grammar and Composition, David Grene, Mc Millan India Ltd
3. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
5. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
6. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
7. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
8. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English	L3
2. Read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention	L2
3. Exhibit self-confidence and speak in formal and informal contexts	L3
4. Apply grammatical knowledge in speech and writing and formulate sentences with accuracy	L2
5. Produce coherent and unified paragraphs with adequate support and detail	L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC15T-1	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
20AC15T-2	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
20AC15T-3	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
20AC15T-4	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
20AC15T-5	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Chemistry
Category BSC
Couse Code 20AC13T

Year I B. Tech.
Semester I Semester
Branch CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To instruct electrode potential and differentiation of different electrodes and their applications.
- To impart knowledge on the basic concepts of battery technology.
- To explain how to synthesize different polymers and differentiate polymers based on properties.
- To introduce different types of instrumental techniques and molecular machines and molecular switches.

Unit 1 Electrochemical Energy Systems - I **10**

Introduction- Electrochemical Cell, Galvanic Cell vs. Electrolytic Cell, Electrochemical conventions. Origin of electrode potential, Electrode Potentials, Measurement of Electrode Potentials, Nernst Equation for a single electrode, EMF of a cell. Types of Electrodes or Half Cells-Hydrogen and Calomel electrodes. Types of Ion Selective Electrodes - glass membrane electrode, polymer membrane electrodes, solid state electrodes, gas sensing electrodes (classification only)

Learning Outcomes

At the end of the unit, the student will be able to:

- Explain the construction of different Ion selective electrodes (L2)
- Solve problems based on cell potential and EMF(L3)
- Apply Nernst equation for calculating electrode and cell potentials (L3)

Unit 2 Electrochemical Energy Systems - II **10**

Basic concepts of batteries, battery characteristics, classification of batteries, Important applications of batteries, Classical batteries-dry/Leclanche cell, Modern batteries-zinc air, lithium cells-Li MnO_2 cell- challenges of battery technology. Fuel cells - Introduction - classification of fuel cells – Hydrogen and Oxygen fuel cell, propane and oxygen fuel cell - Merits of fuel cells.

Learning Outcomes

At the end of the unit, the student will be able to:

- Explain the theory of construction of battery and fuel cells (L2)
- Describe the working principle of Fuel cells (L2)
- Summarize the applications of batteries (L4)

Unit 3 Polymer Chemistry **10**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of Bakelite, urea-formaldehyde, Nylon-6,6. Elastomers Preparation, properties, and applications of Buna-S, Buna-N. Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications

Learning Outcomes

At the end of the unit, the student will be able to:

- Explain the preparation, properties and applications of Bakelite, and Nylon-6,6 (L2)
- Illustrate the mechanism of conduction in polyacetylene and polyaniline (L3)
- Discuss Buna-S and Buna-N elastomers and their applications (L2)

Unit 4 Instrumental Methods and their Applications 9

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law.

Principle and applications of pH metry, Potentiometry, Conductometry, UV-Visible, IR Spectroscopy, Gas Chromatography (GC) Thin layer chromatography (TLC)

Learning Outcomes

At the end of the unit, the student will be able to:

- Distinguish the ranges of different types of spectral series in electromagnetic spectrum (L4)
- Understand the principles of different analytical instruments (L2)
- Differentiate between pH metry, potentiometry and conductometry (L4)

Unit 5 Molecular Machines & Switches 10

Molecular machines: Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor, systems based on Catenanes.

Molecular switches – Introduction to molecular switches, Cyclodextrin-based switches, in and out switching, back and forth switching, displacement switching

Learning Outcomes

At the end of the unit, the student will be able to:

- Describe the mechanism involved in linear motion of Rotaxanes (L2)
- Explain different types of switching in Cyclodextrins (L4)
- Demonstrate the applications of Rotaxanes and Catenanes as artificial molecular machines (L2)

Prescribed Textbooks:

1. O.G. Palanna, Engineering Chemistry, 2/e, Tata McGraw Hill Education Private Limited, 2017.
2. P.C. Jain and M. Jain, Engineering Chemistry, 17/e, Dhanpat Rai & Sons, 2018

Reference Books:

1. Shashi Chawla, A textbook of Engineering chemistry, 3/e, Dhanpat Rai & Co, 2015.
2. Skoog, Holler, Crouch, Principles of Instrumental Analysis, 7/e, Cengage learning, 2018.
3. T. Ross Kelly, Molecular Machines, 1/e, Springer Berlin Heidelberg, 2005
4. Ben L. Feringa, Wesley R. Browne, Molecular Switches, 2/e, Wiley, 2011

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the significance of electrode potentials, classify ion selective electrodes, and list different types of electrodes	L2
2. Compare various batteries, explain the concepts involved in the construction of lithium cells, different fuel cells and apply redox principles for construction of batteries and fuel cells.	L4
3. Illustrate the mechanism of conduction in conducting polymers, and explain the preparation, properties, and applications of various polymers	L3
4. Differentiate various analytical techniques	L4
5. Compare molecular switches and molecular machines, and distinguish between molecular machines	L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC13T.1	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC13T.2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC13T.3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC13T.4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC13T.5	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Algebra and Calculus
Category BSC
Course Code 20AC11T

Year I B. Tech.
Semester I Semester
Branch CE, EEE, ME, ECE, CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

Unit 1 Matrices **10**

Rank of a matrix by echelon form, Normal form, Solving system of homogeneous and non-homogeneous linear equations, Eigen values and Eigen vectors and their properties.

Learning Outcomes

At the end of the unit, the student will be able to:

- Find the rank, Eigen values and Eigen vectors of a matrix (L1)
- Solve systems of linear equations (L3)

Unit 2 Quadratic forms of matrices **8**

Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem, Diagonalization of a matrix, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation.

Learning Outcomes

At the end of the unit, the student will be able to:

- Apply Cayley-Hamilton theorem to find inverse and power of a matrix (L3)
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics (L3)

Unit 3 Mean Value Theorems & Multivariable calculus **10**

Taylor's theorem and Maclaurin's theorem (without proofs) – Simple problems.

Partial derivatives, total derivatives, chain rule, change of variables, Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Learning Outcomes

At the end of the unit, the student will be able to:

- Translate the given function as series of Taylor's and Maclaurin's (L2)
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies, and utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)
- Acquire the Knowledge of maxima and minima of functions of several variables (L1)

Unit 4 Multiple Integrals **8**

Double integrals, change of order of integration, change of variables (Cartesian to polar), areas enclosed by plane curves, evaluation of triple integrals.

Learning Outcomes

At the end of the unit, the student will be able to:

- Extend the definite integral to double and triple integrals in cartesian and polar coordinates (L2)
- Apply double integration techniques in evaluating areas bounded by region (L3)

Unit 5 Special Functions **8**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes

At the end of the unit, the student will be able to:

- Understand the properties of beta and gamma functions and its relations (L2)
- Utilize the special functions in evaluating definite integrals (L3)

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the knowledge to solve System of linear equations.	L3
2. Develop the use of matrix algebra techniques that is needed by engineers for practical applications	L3
3. Classify the functions of several variables which is useful in optimization	L4
4. Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems	L3
5. Understand the properties of beta and gamma functions and its relations	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC11T.2	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Problem Solving through C programming
Category ESC
Course Code 20A511T

Year I B. Tech.
Semester I Semester
Branch CE, EEE, ME, ECE, CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understanding the steps in problem solving and formulation of algorithms to problems.
- Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
- Develop intuition to enable students to come up with creative approaches to problems.
- Develop programs using pointers, structures and unions
- Manipulation of text data using files

Unit 1 Problem Solving and Introduction to C **9**

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development Environments. Introduction to programming: Programming languages and generations.

Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively.

Learning Outcomes: At the end of the unit, the student will be able to

- Identify situations where computational methods and computers would be useful. (L2)
- Approach the programming tasks using techniques learned and write pseudo-code.(L2)
- Choose the right data representation formats based on the requirements of the problem. (L3)
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.(L4)

Unit 2 Introduction to decision control statements and Arrays **9**

Selective, looping and nested statements, jumping statements.

Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations.

Learning Outcomes: At the end of the unit, the student will be able to

- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.(L3)
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs. (L2)
- Design and implement operations on both single and Multidimensional arrays. (L4)

Unit 3 Strings and Functions **9**

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Functions:** Types of functions, recursion, scope of variables and storage classes.

Preprocessor Directives: Types of preprocessor directives, examples.

Learning Outcomes: At the end of the unit, the student will be able to

- Implement and test the programs on strings using string manipulation functions. (L5)
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program (L4)

Unit 4 Pointers **9**

Pointers: Understanding computer's memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task. (L2)
- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage. (L6)

Unit 5 Structures and Files **9**

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define derived data types and use them in simple data processing applications. (L2)
- Develop and test C programs for simple applications using files. (L5)

Prescribed Text Books:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg, Cengage learning, Indian edition.
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication
2. Byron Gottfried, Schaum's" Outline of Programming with C", McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
4. A K Sharma "Computer Fundamentals and Programming", 2nd Edition, University Press, 2018.
5. PradeepDey and Manas Ghosh, "Programming in C", Oxford Press, 2nd Edition, 2017
6. ReemaTharaja "Introduction to C Programming", Second Edition, OXFORD Press, 2015

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Formulate solutions to problems and represent those using algorithms/Flowcharts.	L3
2. Choose proper control statements and use arrays for solving problems.	L3
3. Decompose a problem into modules and use functions to implement the modules.	L4
4. Apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures.	L3
5. Develop the solutions for problems using C programming Language.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511T.1	3	3	3	3	-	1	-	-	-	-	-	-	3	-	-
20A511T.2	3	3	3	3	3	-	-	-	3	-	-	-	3	-	-
20A511T.3	3	2	3	3	3	-	-	-	3	-	-	3	3	-	-
20A511T.4	3	3	3	3	3	-	-	-	3	-	1	3	3	-	-
20A511T.5	3	3	3	3	3	-	-	-	3	-	-	3	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Engineering Workshop
Category ESC(LAB)
Couse Code 20A314L

Year I B. Tech
Semester I Semester
Branch CSE, AI&DS & AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To read and interpret job drawing, plan various operations and make assembly.
- To identify and select the hand tools and instruments used in various trades.
- To gain practical skills by performing the experiments in different trades of workshop.

Trade 1 Carpentry Shop **3**

Three joints (exercises) from : Mortise and tenon T joint, Dove tail joint, Bridle T joint, middle lap T joint, Half Lap joint, cross lap joint, Corner Dovetail joint or Bridle Joint from soft wood stock.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply wood working skills in real world applications. (L3)

Trade 2 Sheet metal shop **3**

Three jobs (exercises) from: Tapered Tray, cylinder, Square, conical funnel from out of 22 or 20 guage G.I. sheet

Learning Outcomes: At the end of the unit, the student will be able to

- Build different parts with metal sheets used in various appliances. (L3)

Trade 3 Fitting shop **3**

Three jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock

Learning Outcomes: At the end of the unit, the student will be able to

- Apply fitting operations in various assemblies. (L3)

Trade 4 House-wiring **3**

Three jobs (exercises) from: Parallel and Series, Two way switch, Tube –Light connection, Stair case connection.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply basic electrical engineering knowledge for house wiring practice. (L3)

Trade 5 Demonstration **1**

Any one trade of Plumbing • Machine Shop • Metal Cutting • Soldering and Brazing

Learning Outcomes: At the end of the unit, the student will be able to

- Get the basic awareness of any of trade demonstrated. (L3)

Prescribed Text Books:

1. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.
2. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.

Reference Books:

1. Jeyapoovan T. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply wood working skills in real world applications.	L3
2. Build different parts with metal sheets used in various appliances.	L3
3. Employ fitting operations in various assemblies.	L3
4. Execute basic electrical engineering knowledge for house wiring practice.	L3
5. Identify various operations and its applications from the demonstration.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A314L.1	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A314L.2	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A314L.3	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A314L.4	2	-	1	-	1	-	-	-	-	-	-	1	-	-	-
20A314L.5	3	-	1	-	1	-	-	-	-	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course IT Workshop
Category ESC (LAB)
Course Code 20A512L

Year I B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Demonstrate the disassembling and assembling of a personal computer system.
- Demonstrate the Installation the operating system and other software required in a personal computer system.
- Introduce connecting the PC on to the internet from home and work place and effectively usage of the internet, Usage of web browsers, email, news groups and discussion forums.
- Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations.
- To utilize Cloud based productivity enhancement and collaboration tools

Task 1 **3**

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report

Learning Outcomes

At the end of the module, the student will be able to:

- Identify the parts of a computer (L2)
- Know the usage of internal parts of a computer (L2)

Task 2 **3**

Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able. Student should Students should record the process of assembling and troubleshooting a computer.

Learning Outcomes: At the end of the module, the student will be able to:

- Trouble shoot the computer and identify working and non-working parts (L1)
- Identify the problem correctly by various methods available (eg: beeps). (L2)

Task 3 **3**

Install Operating System: Student should install Linux on the computer. Students should record the entire installation process.

Learning Outcomes: At the end of the module, the student will be able to:

- Install another operating system (L2)
- Know how to install software's (L1)

Task 4 **3**

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Learning Outcomes: At the end of the module, the student will be able to:

- Share the information between two computers (L2)
- Connect two or more computers using switch/hub (L3)

Task 5 **3**

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Learning Outcomes: At the end of the module, the student will be able to:

- Create e-mail account and send email (L3)
- Browse internet for required information (L2)

Task 6 **3**

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Learning Outcomes: At the end of the module, the student will be able to:

- Install different antivirus software's (L2)
- Check threats to the computer being used (L2)

Task 7 **6**

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered. .

Learning Outcomes: At the end of the module, the student will be able to:

- Prepare project documents, user manuals (L4)
- Get the knowledge on word processor tool (L2)

Task 8 **6**

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Learning Outcomes: At the end of the module, the student will be able to:

- Create, open and save spread sheets (L4)
- Apply formulas for different tasks (L4)

Task 9 **6**

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Learning Outcomes: At the end of the module, the student will be able to:

- Create, open and save slides (L4)
- Create their own presentations for seminars (L4)

Task 10 **3**

Store, sync, and share files with ease in the cloud-Google Drive

Document creation and editing text documents in your web browser- Google docs

Learning Outcomes: At the end of the module, the student will be able to:

- Know the usage of google drive (L2)
- Create and share google docs in web browser (L3)

Prescribed Text Books:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. Upgrading and Repairing PC's, 22nd Edition, Scott Muller QUE, Pearson Education.
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEY Dreamtech.
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy
2. Network Your Computer & Devices Step by Step 1st Edition, Ciprian Rusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill
5. Cloud computing, productivity and collaboration tools, software and products offered by Google:https://en.wikipedia.org/wiki/G_Suite

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Recognize the peripherals of a computer, perform assembling and disassembling of various components of a computer.	L1, L3
2. Describe and perform installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components.	L2, L3
3. Use Web browsers to access Internet, Search Engines.	L3
4. Use word processor; spread sheet, presentation and data storage tools.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A512L.1	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-
20A512L.2	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-
20A512L.3	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-
20A512L.4	3	3	3	-	3	-	-	-	-	-	-	3	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Communicative English Lab
Category HSMC(LAB)
Couse Code 20AC15L

Year I B. Tech.
Semester I Semester
Branch CE, ME, CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To learn better English pronunciation
- To use language effectively in everyday conversations
- To make formal oral presentations using effective strategies in professional life
- To be exposed to a variety of self-instructional, learner friendly modes of language learning

Detailed Syllabus:

Pronunciation: **6**

Introduction to English speech sounds

Learning Outcome:

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English and speak in intelligible way

Listening:

Listening Comprehension- Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. Answering a series of questions about main idea and supporting ideas after listening to audio texts. Listening for global comprehension and summarizing what is listened to.

Learning Outcome:

At the end of the module, the learners will be able to

- Adopt better strategies to listen attentively and comprehend attentively

Speaking **24**

Situational Dialogues (Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions - Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.)

Oral Presentations: Formal oral presentations on topics from academic contexts - Formal presentations using PPT slides with graphic elements, deliver an enthusiastic and well-practiced presentation

Describing people and situations (learn new adjectives, practice describing themselves and others, describe objects using proper adjectives, use details in pictures to make predictions orally, describing situations, Integrate and evaluate information presented in diverse media visually and orally

Learning Outcomes:

At the end of the module, the learners will be able to

- speak confidently in formal and informal contexts
- comprehend and produce short talks on general topics
- use specific vocabulary to describe different persons, places and objects

Reading **6**

Information Transfer (Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/ relationships, communicate processes or display complicated data.

Learning Outcome:

At the end of the unit, the student will be able to

- Analyze data given in an infographic and write/speak about it

Minimum Requirements:

1. Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Prescribed Textbook: Lab Manual developed by Faculty Members of AITS Rajampet

Suggested Software:

1. Loose Your Accent in 28 days, CD Rom, Judy Ravin
2. Sky Pronunciation Suite
3. Clarity Pronunciation Power – Part I
4. Learning to Speak English - 4 CDs

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Neutralize their pronunciation of English sounds, and their accent	L3
2. Adopt effective listening skills for better comprehension of English, spoken by native speakers	L2
3. Illustrate themselves in social and professional context effectively	L3
4. Improve their public speaking skills and make technical presentations confidently	L4
5. Describe people and situations using adjectives effectively	L3
6. Assess and Deduct data from graphs/pie charts/tables	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC15L-1	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-
20AC15L-2	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
20AC15L-3	-	-	-	-	-	-	-	-	3	3	-	3	-	-	-
20AC15L-4	-	-	-	-	-	-	-	-	3	2	-	1	-	-	-
20AC15L-5	-	-	-	-	-	-	-	-	1	3	-	3	-	-	-
20AC15L-6	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Chemistry Lab
Category BSC(LAB)
Couse Code 20AC13L

Year I B. Tech.
Semester I Semester
Branch CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To familiarize the students with the basic concepts of chemistry
- To train the students on how to handle the instruments.
- To familiarize the students with digital and instrumental methods of analysis.
- To expose the students in practical aspects of the theoretical concepts.

List of experiments

1. Determination of Zinc by Copmplexometry.
2. Estimation of active chlorine content in Bleaching powder
3. Determination of copper by Iodometry
4. Estimation of ferrous iron by Dichrometry
5. Preparation of Phenol-Formaldehyde resin
6. Determination of Fe (II) in Mohr's salt by potentiometric method
7. Determination of chromium (VI) in potassium dichromate
8. Estimation of mixture of acids by conductometric titration
9. Determination of strength of an acid by pH metric method
10. Determination of viscosity of a liquid by Redwood Viscometer-1
11. Determination of functional groups in the given organic compound
12. Separation of components of a sample by Thin layer chromatography

Prescribed Textbooks:

1. J. Mendham, R.C Denney, J.D Barnes, M. Thomas, B. Sivasankar Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers, 2009.
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company 2009.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Operate instruments such as pH meter, conductivity meter, viscometer and potentiometer.	L3
2. Estimate Zn, Cr, Fe, Cu and other functional groups in various samples	L2
3. Determine physical properties of liquids and synthesize polymers and nanomaterials	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC13L.1	3	2	-	2	2	-	-	-	-	-	-	2	-	-	-
20AC13L.2	3	2	-	2	2	-	-	-	-	-	-	2	-	-	-
20AC13L.3	3	2	-	2	2	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Problem Solving through C Programming Lab
Category ESC(LAB)
Course Code 20A511L

Year I B. Tech.
Semester I Semester
Branch CE, EEE, ME, ECE, CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Setting up programming environment.
- Develop Programming skills to solve problems.
- Use of appropriate C programming constructs to implement algorithms.
- Identification and rectification of coding errors in program
- Develop applications using a modular programming and Manage data using files.

Minimum number of FOUR programs from each exercise is to be done students

Data Types, Constants, Input and Output and expressions

Exercise 1: Data types, Variables, Constants and Input and Output.
Exercise 2: Operators, Expressions and Type Conversions.
Learning Outcomes
At the end of this module, the student will be able to:

- Identify situations where computational methods and computers would be useful. (L2)
- Approach the programming tasks using techniques learned and write pseudo-code. (L2)
- Write the program on a computer, edit, compile, debug, correct, recompile and run it. (L4)

Decision Control Statements and Arrays

Exercise 3: Conditional Statements [two way and multipath].
Exercise 4: Loop Control Statements. [for, while and do-While]
Exercise 5: Unconditioned JUMP Statements- break, continue, goto.
Exercise 6: Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7: Multidimensional Arrays
Learning Outcomes
At the end of this module, the student will be able to:

- Choose the right data representation formats based on the requirements of the problem. (L3)
- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand. (L3)
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs. (L2)
- Design and implement operations on both single and Multidimensional arrays. (L6)

Strings and Functions

Exercise 8: String Basics, String Library Functions and Array of Strings.
Exercise 9: Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10: Storage classes- Auto, Register, Static and Extern
Exercise 11: Recursive Functions, Preprocessor commands.
Exercise 12: Array Elements as Function Arguments.
Learning Outcomes: At the end of this module, the student will be able to:

- Implement and test the programs on strings using string manipulation functions. (L5)
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program (L4)

Pointers

Exercise 13: Pointers, Dynamic memory allocation and error handling

Learning Outcomes:

At the end of this module, the student will be able to:

- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage. (L6)
- Identify tasks in which the dynamic memory allocation techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task. (L2)

Structures and Files

Exercise 14: Structures

Exercise 15: File handling

Learning Outcomes:

At the end of this module, the student will be able to:

- Define structure data types and use them in simple data processing applications. (L2)
- Develop and test C programs for simple applications using files. (L6)

Prescribed Text Books:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg,Cengage learning, Indian edition.
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. Let Us C, YeswanthKanitkar, Ninth Edition, BPB Publication
2. A K Sharma “Computer Fundamentals and Programming”, 2nd Edition, University Press, 2018.
3. PradeepDey and Manas Ghosh, “Programming in C”, Oxford Press, 2nd Edition, 2017
4. ReemaTharaja “Introduction to C Programming”, Second Edition, OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Identify and setup program development environment	L2
2. Implement the algorithms using C programming language constructs	L5
3. Identify and rectify the syntax errors and debug program for semantic errors	L3
4. Solve problems in a modular approach using functions	L5
5. Implement file operations with simple text data	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511L.1	3	3	-	3	3	-	-	-	3	1	1	-	3	-	-
20A511L.2	3	3	-	-	-	-	-	-	3	-	-	-	3	-	-
20A511L.3	3	3	3	3	-	-	-	-	3	-	-	3	3	-	-
20A511L.4	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-
20A511L.5	3	3	3	3	-	-	-	-	-	-	-	3	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Environmental Science
Category MC
Couse Code 20AC16T

Year I B. Tech.
Semester I Semester
Branch CE, ME, CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:

- To make the student to be aware of environment and understand the importance of protecting natural resources.
- To enable the student to understand the importance of ecosystems and biodiversity for future generations.
- To sensitize the student with pollution problems due to the day-to-day activities of human life.
- To enable the student acquire skills for identifying and solving the social issues related to environment.
- To enable the student to understand the impact of human population on the environment.

Unit 1 Multidisciplinary Nature of Environmental Studies 10

Definition, Scope and Importance – Need for Public Awareness. Natural resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation– Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources – Food resources: Impacts of overgrazing, problems with traditional agriculture, effects of modern agriculture – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the importance of public awareness (L1).
- Identify various natural resources (L2).

Unit 2 Ecosystems, Biodiversity and its Conservation 10

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, lake ecosystem.

Biodiversity and Its Conservation: Definition – Value of biodiversity - Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the concept of ecosystem (L2).
- Recognize the importance of biodiversity (L2).

Unit 3 Environmental Pollution 8

Definition, Causes, effects and control measures of: Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Learning Outcomes: At the end of the unit, the student will be able to:

- Illustrate the different types of pollution (L2).
- Describe various sources, effects and control measures of pollution (L2).

Unit 4 Social Issues and the Environment 10

Rain water harvesting, Environmental ethics: Issues and possible solutions – global warming, acid rain, ozone layer depletion – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Learning Outcomes: At the end of the unit, the student will be able to:

- Interpret social issues related to environment (L3).
- Relate importance of environmental acts (L4).

Unit 5 Human Population and the Environment 7

Population explosion – Family Welfare Programmes – Environment and human health – Value Education – HIV/AIDS – Role of information Technology in Environment and human health, Field work – Visit to a local area to document environmental assets.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the effects of population explosion (L1).
- Identify the natural assets and their relationship (L2).

Prescribed Textbooks:

1. Perspectives in environmental Studies, Anubha Kaushik and C P Kaushik, New Age International Publishers, New Delhi, 2018.
2. A Textbook of Environmental Studies, Shashi Chawla, McGraw Hill Education, New Delhi, 2017.

Reference Books:

1. Environmental Studies by Benny Joseph, McGraw Hill Education, New Delhi, 2017.
2. A textbook of environmental studies, A Dhinakaran and B Sankaran, Himalaya Publishing House, Mumbai, 2017.
3. Fundamentals of environmental studies, Mahua Basu and S Xavier, Cambridge University Press, New Delhi, 2017.
4. Textbook of Environmental Studies for undergraduate courses, Erach Bharucha for University Grant Commission, University press, New Delhi, 2013.
5. A textbook of environmental studies, Vijay kumarTiwari, Himalaya Publishing House, Mumbai, 2017.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain how natural resources should be used.	L2
2. Identify the need to protect ecosystems and biodiversity for future generations.	L2
3. List out the causes, effects, and control measures of environmental pollution.	L1
4. Demonstrate knowledge to the society in the proper utilization of goods and services.	L3
5. Outline the interconnectedness of human dependence on the earth's ecosystems.	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC16T.1	1	1	-	-	-	3	3	1	-	-	-	3	-	-	-
20AC16T.2	1	2	-	-	-	3	3	1	-	-	-	3	-	-	-
20AC16T.3	1	1	-	-	-	3	3	1	-	-	-	3	-	-	-
20AC16T.4	1	1	-	-	-	3	3	1	-	-	-	3	-	-	-
20AC16T.5	1	1	-	-	-	3	3	1	-	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Applied Physics
Category BSC
Couse Code 20AC22T

Year I B. Tech.
Semester II Semester
Branch CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To impart knowledge in basic concepts of wave optics, electromagnetic theory and fiber optics.
- To explain the significant concepts of dielectrics, magnetic materials, semiconductors and superconductors in the field of engineering and their potential applications.
- To familiarize the applications of nanomaterials relevant to engineering branches.

Unit 1 Wave Optics **9**

Interference-Principle of Superposition-Interference of light- Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength- Engineering applications of interference.

Diffraction-Fraunhofer Diffraction-Single and double slit Diffraction -Diffraction Grating – Grating Spectrum - Determination of Wavelength-Engineering applications of diffraction.

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain the need of coherent sources and conditions for sustained interference and illustrate the concept of polarization of light and its applications. (L2)
- Identify engineering applications of interference including homodyne and heterodyne detection. (L3)
- Analyze the differences between interference and diffraction and classify ordinary and extraordinary polarized light. (L4)

Unit 2 Dielectric and Magnetic materials **11**

Introduction-Dielectric Polarization-Dielectric polarizability- Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (quantitative), Orientation polarizations (qualitative) -Frequency dependence of polarization- Lorentz (internal) field - Claussius -Mosotti equation-Applications of Dielectrics - ferroelectricity.

Introduction- Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Weiss domain theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain the concept of dielectric constant and polarization in dielectric materials. (L2)
- Classify the magnetic materials based on susceptibility and their temperature dependence. (L2)
- Apply the concept of magnetism and magnetic devices. (L3)

Unit 3 Electromagnetic Waves and Fiber Optics **9**

Divergence and Curl of Electric and Magnetic Fields-Gauss theorem for divergence and stoke's theorem for curl-Maxwell's Equations (quantitative)- Electromagnetic wave propagation (non-conducting medium)- Poynting's Theorem.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle - Numerical Aperture-Classification of fibers based on Refractive index profile, modes (step index, Graded index optical fibers) – attenuation and losses in optical fibers-Block diagram of fiber optic communication- Medical Applications-Fiber optic Sensors.

Learning Outcomes: At the end of the unit, the student will be able to:
- Apply the Gauss' theorem for divergence and Stoke's theorem for curl. (L3)
- Apply electromagnetic wave propagation in different guided media. (L3)
- Classify optical fibers based on refractive index profile and mode of propagation and identify the applications of optical fibers in medical, communication and other fields. (L2)

Unit 4 Semiconductors 8

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi-conductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents – Einstein's relation - Applications of Semiconductors.

Learning Outcomes: At the end of the unit, the student will be able to:
- Outline the properties of n-type and p-type semiconductors and charge carriers. (L2)
- Interpret the direct and indirect band gap in semiconductors. (L2)
- Identify the type of semiconductor using Hall effect. (L2)

Unit 5 Superconductors and Nano materials 8

Superconductors-Properties- Meissner's effect - Types of Superconductors - BCS Theory-Josephson effect (AC & DC)- Applications of superconductors.

Nano materials – significance of nanoscale - properties of nanomaterials: physical, mechanical, magnetic, Optical, Thermal - synthesis of nanomaterials: top-down - ball milling- Bottom-up - Chemical vapor deposition- characterization of nanomaterials: X-ray diffraction (XRD)- Scanning Electron Microscope (SEM) - Applications of Nano materials.

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain how electrical resistivity of solids changes with temperature. (L2)
- Classify superconductors based on Meissner's effect. (L2)
- Apply the basic properties of nanomaterials in various engineering branches. (L3)

Prescribed Textbooks:
1. M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arunmurthy, A Textbook of Engineering Physics, S. Chand Publications,11th edition, 2019
2. T Pradeep, A textbook of Nano Science and Nano Technology, Tata McGraw Hill, 2013
3. Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2011

Reference Books:
1. David J. Griffiths, Introduction to Electrodynamics, 4/e, Pearson Education, 2014
2. K. Thyagarajan, Applied Physics, McGraw Hill Education (India) Private Ltd, 2019
3. Gerd Keiser, Optical Fiber Communications, 4/e, Tata Mc Graw Hill, 2008

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the concepts of interference, diffraction and polarization and identify their applications in engineering field.	L2
2. Summarize the various types of polarization of dielectrics, classification of magnetic materials and the applications of dielectric and magnetic materials.	L2
3. Apply electromagnetic wave propagation in different guided media and Explain fiber optics concepts in various fields with working principle.	L3
4. outline the properties of various types of semiconductors and identify the behavior of semiconductors in various fields	L2
5. Explain various concepts of superconductors and nanomaterial's with their applications in various engineering branches.	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC22T.1	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC22T.2	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC22T.3	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC22T.4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC22T.5	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Differential Equations and Vector Calculus
Category BSC
Course Code 20AC21T

Year I B. Tech.
Semester II Semester
Branch CE, EEE, ME, ECE, CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

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.

Unit 1 **Linear differential equations of higher order with constant Coefficients** **10**

Basic concepts - general solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type $e^{ax}, \sin ax / \cos ax$, polynomials in x, $e^{ax} \sin ax / e^{ax} \cos ax / e^{ax} x^n, x \sin ax / x \cos ax$ -method of variation of parameters.

Learning Outcomes: At the end of the unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)

Unit 2 **Equations reducible to Linear Differential Equations with constant coefficients** **8**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients
Applications**:** Electrical Circuits – L-C and L-C-R Circuit problems.

Learning Outcomes: At the end of the unit, the student will be able to

- Classify and interpret the solutions of linear differential equations (L4)
- Generalize and solve the higher order differential equation by analyzing physical situations (L3)

Unit 3 **Partial Differential Equations** **8**

Formation of PDEs by eliminating arbitrary constants and arbitrary functions, solutions of first order linear and non-linear PDEs (Charpit's method). Introduction to method of separation of variables for second order linear Partial Differential Equations.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply the techniques to find solutions of standard PDEs (L3)
- Solve the boundary value problems (L3)

Unit 4 **Vector Differentiation** **8**

Scalar and vector point functions, vector operator Del, Gradient, Divergence and Curl operators, vector identities.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply del to scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L2)

Unit 5 **Vector Integration** **10**

Line integral-circulation-work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes: At the end of the unit, the student will be able to

- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Prescribed Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields	L3
2. Generalize and solve the higher order differential equation by analyzing physical situations	L3
3. Identify solution methods for partial differential equations that model physical processes	L3
4. Understand the physical meaning of different operators such as gradient, curl and divergence	L2
5. Find the work done against a field, circulation and flux using vector calculus	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC21T.3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Basic Electrical and Electronics Engineering
Category ESC
Course Code 20A223T

Year I B. Tech.
Semester II Semester
Branch CE, CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To impart the basic knowledge about fundamental laws and electric circuits.
- To understand the working of various DC Machines.
- To understand the working of various AC Machines.
- To know about various electronic devices.
- To understand the various electrical installations and measuring instruments

Unit 1 Fundamental Laws and Electrical Circuits 9

Basic definitions - Voltage, current, power, energy, charge, flux, static and dynamic emf, Faraday's laws of electromagnetic induction, Fleming's right hand rule, Fleming's left hand rule, Lenz's law, Cork screw rule, Right hand thumb rule, Right hand palm rule, types of elements, ohms law, resistive, inductive, capacitive networks, Series-parallel circuits and Kirchhoff's laws.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the fundamental laws of Electrical Engineering (L1)
- Understand the Kirchhoff's laws (L1)

Unit 2 DC Machines 9

DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications.

DC Motor: principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Swinburne's test and Speed control methods.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand construction and operation of DC machines (L1)
- Analyze the performance of DC machines (L3)
- Know the speed control methods of DC motor (L1)

Unit 3 AC Machines 9

1-Φ Transformer: Principle of operation, emf equation, losses, efficiency and regulation calculations using OC and SC tests. Three Phase Transformer: Principle of operation.

3-Φ Alternator: Principle of operation of alternators-Regulation by synchronous impedance method. 3-Φ Induction Motor: Principle of operation of induction motor, Brake Test on 3-Φinduction motor.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand construction and operation of various AC machines (L1)
- Analyze the performance of various AC machines (L3)

Unit 4 Diode and Transistor 9

Diode: PN junction diode, symbol, v-I characteristics, applications, half wave, full wave and bridge rectifiers. **Transistor:** PNP and NPN transistor, characteristics of CE configuration.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand operating characteristics of PN junction diode (L1)
- Know the applications of PN junction diode (L1)
- Understand the operation of various types of BJTs (L1)
- Understand operating characteristics of CE configuration of BJTs (L1)

Unit 5 **9**

Introduction, Electrical and Electronic Instruments, Classification of Instruments, Multimeter, Function generator, CRO: Block diagram of CRO, Principle of CRT (Cathode Ray Tube), applications of CRO, voltage, current and frequency measurements using CRO.

Switch Fuse Unit (SFU), MCB, types of wires and cables, earthing, elementary calculations for energy consumption.

Learning Outcomes: At the end of the unit, the student will be able to:

- Know the types of measuring instruments (L1)
- Understand the construction and operation of measuring instruments (L1)
- Know the various electrical installations (L1)

Prescribed Textbook:

1. V.K. Mehta, Principles of Electrical and Electronics Engineering. S. Chand & Co 2010.
2. T.Thyagarajan, Fundamentals of Electrical and Electronics Engineering. SciTech publications, 2011, 5th Ed
3. D. C. Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
4. P.S.Dhogal "Basic Electrical Engineering with Numerical Problems" McGraw Hill, 2006.
5. A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.

Reference Books

1. M.S Naidu and S.Kamakshaiah, Introduction to Electrical Engineering. TMH Publications.
2. D.P Kothari and I.J Nagrath, Basic Electrical Engineering, TMH, 3rdEd.2010
3. Millman and Halkias, Electriconics devices and circuits
4. S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Impart the basic knowledge about the Electric circuits.	L1
2. Understand the working of various DC Machines and analyze their performance.	L1 & L4
3. Understand the working of various AC Machines and analyze their performance.	L1 & L4
4. Know about various electronic devices.	L1
5. Impart the basic knowledge about the Electric circuits.	L1

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A223T.1	2	2	-	2	-	-	-	-	2	-	2	-	-	-	-
20A223T.2	2	3	2	2	-	-	-	-	2	-	2	-	-	-	-
20A223T.3	2	3	2	2	-	-	-	-	2	-	2	-	-	-	-
20A223T.4	2	2	-	3	-	-	-	-	2	-	2	-	-	-	-
20A223T.5	2	2	1	3	-	-	-	-	2	-	2	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Engineering Drawing
Category ESC
Couse Code 20A324T

Year I B. Tech.
Semester II Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives:

- To bring awareness that Engineering Drawing is the Language of Engineers.
- To familiarize how industry communicates technical information.
- To teach the practices for accuracy and clarity in presenting the technical information.
- To develop the engineering imagination essential for successful design.
- To provide the basic geometrical information to ignite the innovative design ideas.

Unit 1 Introduction to Drawing and Engineering Curves. Theory Hours: 05, Practice sessions:04

Introduction: Lettering–Geometrical Constructions-Construction of polygons by General method.

Conics: Ellipse, Parabola and Hyperbola (General method only). Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcs of Circles method - Drawing tangent & normal to the conics.

Cycloidal Curves: Cycloid, Epi-cycloid, Hypo-cycloid (simple problems) - Drawing tangent & normal to the Cycloidal curves.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the significance of engineering drawing and understand the geometrical constructions, conventions used in the engineering drawing.(L2)
- Identify the curves obtained in different conic sections and able to draw different conic curves. (L1)
- Know and draw the different Cycloidal curves, also its practical application in engineering. (L1)

Unit 2 Projections of Points and Lines. Theory Hours: 03, Practice sessions: 06

Projections of points - Projections of lines inclined to one reference plane, Projections of lines inclined to both reference planes. True lengths and Traces of lines (simple problems).

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the principles and elements of projection. (L2)
- Know how to draw the projections of points, lines. (L1)
- Differentiate between projected length and true length and also find the true length of the lines. (L1)

Unit 3 Projections of Planes. Theory Hours: 05, Practice sessions: 04

Projection of planes inclined to one reference plane - and inclined to both the reference planes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the projections of different geometrical regular plane surfaces. (L2)
- Identify and Construct the true shapes of the plane surfaces. (L1)
- Analyze the projections of plane surface inclined to both the planes. (L4)

Unit 4 Projections of Solids. Theory Hours: 04, Practice sessions: 05

Projections Of simple Solids such as Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference plane, Axis inclined to both the reference planes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand different types of solids. (L2)
- Draw projection of simple solids. (L3)

Unit 5 Isometric Projections & Conversion of View. Theory Hours: 04, Practice sessions:05

Isometric Projections: Projections of Lines, Planes and Simple Solids – Prism, Pyramid, Cylinder and Cone in simple positions only.

Conversion of Views: Conversions of Orthographic views in to Isometric views and Conversion of Isometric views to Orthographic views.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the pictorial views such as isometric views, orthographic views and also differentiate between Isometric Projection and View. (L2)
- Draw the Isometric views of simple plane surfaces and simple solids. (L3)
- Draw the conversions of Isometric Views in to Orthographic Views and Vice-versa. (L3)

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, Edition2016
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub, Edi2016

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age, Ed2015.
2. Engineering Drawing, Johle, Tata McGraw-Hill. Ed2014
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education Ed2015

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the concepts of Conic Sections.	L1, L2
2. Understand the concept of Cycloidal Curves, Involutes and the application of industry standards.	L1, L2
3. Understand the Orthographic Projections of Points and Lines and are capable to improve their visualization skills, so that they can apply these skills in developing the new products.	L1, L2, L4
4. Understand and apply Orthographic Projections of Planes.	L2, L3
5. Understand and analyze the Orthographic Projections of Solids and conversion of isometric views to orthographic views vice versa.	L2, L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A324T.1	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A324T.2	3	-	-	-	-	3	2	-	1	2	-	-	-	-	-
20A324T.3	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A324T.4	3	2	-	-	-	3	2	-	1	2	-	-	-	-	-
20A324T.5	3	-	2	-	2	2	-	3	3	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Data Structures through Python
Category ESC
Course Code 20A521T

Year I B. Tech.
Semester II Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To learn basics of computational problem solving, python programming and basic control structures.
- To know python programming basic constructs like lists, dictionaries, sets and functions
- To understand basics of object-oriented programming
- To understand the performance of the implementations of basic data structures.

Unit 1 **12**

Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Control structure importance, Boolean expressions, selection control, and iterative control.

Data Structures in python: List structures, lists in python, iterating over lists (sequences) in python, more on python lists, Dictionary, Set

Learning Outcomes: At the end of the unit, the student will be able to

- Use the data types, operators and control structures in python (L2)
- Apply the List, set and dictionary (L3)

Unit 2 **11**

Functions: Program routines, more on functions. Module Design: Modules, Top-Down design, python modules. String Processing: String Traversal, String-Applicable Sequence Operations. String Methods

Introduction to Object oriented programming: class, three fundamental features of object-oriented programming. What is encapsulation? Defining classes in python.

Data abstraction and through classes, special methods, calling a class method from another class method, garbage collection, class and static methods.

Learning Outcomes: At the end of the unit, the student will be able to:

- Demonstrate the importance of functions and module design in python (L3)
- Define object oriented concepts like class, object (L2)

Unit 3 **10**

Inheritance: Introduction, Inheriting classes in python, types of inheritance, abstract classes and interfaces.

Polymorphism: Operator overloading: Introduction, implementing operator overloading, method overriding.

Error and Exception handling: introduction, handling exceptions, multiple except blocks, multiple exceptions in a single block, the else clause, raising exceptions, instantiating exceptions, handling exceptions in invoked functions, built-in and user defined exceptions, the finally block, Assertions in python.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define and use object oriented concepts like inheritance and polymorphism (L2)
- Demonstrate and classify error and exception handling (L3)

Unit 4 **9**

Data structures: Introduction to abstract data types, Single Linked List-traversing, searching, prepending, and removing nodes. Stacks-implementing using python list & linked list, Queues-implementing using python list & linked list.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the importance of abstract data types (L2)
- Illustrate data structures like stack queue and linked list (L4)

Unit 5 **9**

Binary Trees: The Tree structure, the binary tree, priority queues-heaps
Search trees: The binary search tree, search tree iterators, AVL trees
Learning Outcomes: At the end of the unit, the student will be able to:

- Summarize and construct the binary trees and able to implement priority queues (L5)
- Outline and use the search trees (L3)

Prescribed Text Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.
2. Data Structures and Algorithms using Python, Rance D.Necaise, Wiley Publications.

Reference Books:

1. Core Python Programming, R. Nageswara Rao, Dream Tech Press (Wiley India), 2017 Edition
2. Data Structures and Algorithms in Python by Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, Wiley Publications
3. Python Programming using problem solving approach, ReemaThareja, Oxford University press
4. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc., 3rd Edition
5. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications
6. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand and apply python programming basic constructs like lists, dictionaries, sets and functions.	L1, L3
2. Illustrate module design and identify the importance of object oriented programming	L3, L4
3. Demonstrate inheritance and polymorphism and classify error and exception handling	L3, L4
4. Implement the linear data structure like stack, queue and linked list	L5
5. Summarize and construct the data structures like hash tables, binary trees and search trees	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A521T.1	3	-	3	-	-	-	-	-	-	-	-	3	3	-	-
20A521T.2	3	-	3	3	-	-	-	-	-	-	-	3	3	-	-
20A521T.3	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A521T.4	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A521T.5	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Applied Physics Lab
Category BSC(LAB)
Couse Code 20AC22L

Year I B. Tech.
Semester II Semester
Branch CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Learn the concepts of interference , diffraction and their applications and the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor.
- Know about the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

List of Experiments

1. Determination of the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of Dispersive power of a diffraction grating
5. Determination of Resolving power of a grating
6. Determination of dielectric constant by charging and discharging method.
7. Determination of Magnetic field along the axis of a circular coil carrying current.
8. Determination of the self inductance of the coil (L) using Anderson's bridge.
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
10. Determination of the numerical aperture of a given optical fiber and hence to find its acceptance angle.
11. Measurement of magnetic susceptibility by Gouy's method
12. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
13. Determination of the resistivity of semiconductor by Four probe method
14. Determination of the energy gap of a semiconductor
15. Measurement of resistance with varying temperature.

References:

1. S. Balasubramanian, M.N. Srinivasan A Text book of Practical Physics, S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

Course Outcomes:	Blooms Level of Learning
At the end of the course, student will be able to	
1. Operate various optical instruments and estimate various optical parameters.	L3
2. Estimate the various magnetic properties.	L4
3. Measure properties of semiconductors.	L4 & L5
4. Determine the properties of dielectric materials and optical fiber materials.	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC22L.1	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
20AC22L.2	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
20AC22L.3	2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
20AC22L.4	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Basic Electrical and Electronics Engineering Lab
Category ESC(LAB)
Couse Code 20A223L

Year I B. Tech.
Semester II Semester
Branch CE, CSE and AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To impart knowledge and practical exposure on various elements of electrical circuits, operational aspects of various electrical machines and electronic circuits

List of Experiments

Perform any ten experiments out of the following.

1. Determination of Performance Characteristics of DC Shunt Motor (Brake Test)
2. Speed Control of DC Shunt Motor (Armature Control Method and Field Control Method)
3. Determination of Performance Characteristics of Three Phase Squirrel Cage Induction Motor (Brake Test)
4. Predetermination of efficiency and regulation of Single Phase Transformer at different power factors (OC and SC test on single phase transformers)
5. Predetermination of efficiency of DC Shunt machine by indirect Test.(Swinburnes Test)
6. Verification of Kirchhoff's Voltage and Current Law
7. Study of V-I Characteristics of PN junction Diode.
8. Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without capacitive filter.
9. Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without capacitive filter.
10. Study of Input and Output Characteristics of Bipolar Junction Transistor in Common Emitter Configuration.
11. Study of Cathode Ray Oscilloscope. (CRO)
12. Determination of V-I Characteristics of ZENER Diode.
13. Study of Frequency response of a single stage CE amplifier

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply the conceptual knowledge of various electrical machines to understand their operation and control aspects through practical investigations	L3
2. Apply the conceptual knowledge of semiconductor devices to analyze the electronic circuits through practical investigations	L3
3. Apply ethics and norms of the engineering practices while exercising experimental investigations	L3
4. Function effectively as an individual and as a member in a team	L1
5. Communicate effectively in verbal and written forms	L1

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A223L.1	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
20A223L.2	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
20A223L.3	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
20A223L.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
20A223L.5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Data Structures through Python Lab
Category ESC(LAB)
Course Code 20A521L

Year I B. Tech.
Semester II Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
- To practice basics of python programming and basic control structures.
- To practice python programming basic constructs like lists, dictionaries, sets and functions
- To practice module design and usage of exception handling in python programming
- To practice basics of object oriented programming and elementary data structures.

List of Programs

Exercise 1: Install Python ecosystem and execute "Hello World" program.
Exercise 2: Practice
a. Python literals, variables, identifiers and data types
b. Python operators
c. Input and output statements.
d. Control statements
Learning Outcomes: At the end of the module, the student will be able to:
- Use variables, data types and operators (L2)
- Write programs that can take input and prints output in different forms and able to use control statements (L3)

Exercise 3: Practice Python Programs on Numbers
a. Prime Numbers
b. Armstrong Numbers
c. Fibonacci Numbers and Series
d. Sum of squares for the first n natural numbers.
e. Reverse of a number
Exercise 4: Practice python programs on Various types of triangle patterns
Learning Outcomes: At the end of the module, the student will be able to:
- Apply and analyze control statements in different examples (L3, L4)

Exercise 5: Implement python programs on functions, find factorial and Fibonacci number using recursion
Learning Outcomes: At the end of the module, the student will be able to:
- Implement functions in python and use them (L5)

Exercise 6: Practice python programs on lists, sets and dictionaries
Exercise 7: Practice any one python program on module design
Exercise 8: Practice python programs on string processing and exception handling
Learning Outcomes: At the end of the module, the student will be able to:
- Illustrate data structures of python with the help of examples (L3)
- Analyze and apply the importance of module, string processing and exception handling (L4)

Exercise 9: Practice Python Programs
a) Write python program to implement encapsulation and abstraction
b) Write a python program to implement class variables and object variables

Exercise 10: Practice Python Programs

a) Write a python program to implement static variables and static methods.
b) Write a python program to implement super()
c) Write a python program to implement types of inheritance.

Exercise 11: Practice python programs

a) Write a python program to implement the method overloading and method overriding.
b) Write a python program to implement the abstract classes and interfaces.

Learning Outcomes: At the end of the module, the student will be able to:

- Visualize and write programs on the object oriented concepts in python (L3)

Exercise 12: Implement python programs on

i) Stacks ii) Queues

Exercise 13: Implement Single linked list data structure.

Learning Outcomes: At the end of the module, the student will be able to:

- Implement data structures like stack, queue and linked list (L5)

Exercise 14: Implement priority queue data structure.

Exercise 15: Implement binary search tree data structure.

Learning Outcomes: At the end of the module, the student will be able to:

- Implement priority queue data structure (L5)
- Write program on binary search tree data structure (L5)

Prescribed Text Books:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.
2. Data Structures and Algorithms using Python, RanceD.Necaise, Wiley Publications.

Reference Books:

1. Core Python Programming, R. Nageswara Rao, Dream Tech Press (Wiley India), 2017 Edition
2. Data Structures and Algorithms in Python by Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, Wiley Publications
3. Python Programming using problem solving approach, ReemaThareja, Oxford University press
4. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc., 3rd Edition
5. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications
6. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply basics of python programming	L3
2. Write programs on the basic object oriented programming in python language, handling of exceptions	L3
3. Implement linear data structure in python programming	L5
4. Develop and write programs for priority queues	L5
5. Construct and write the implementation of binary search tree	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A521L.1	3	-	3	-	-	-	-	-	-	-	-	3	3	-	-
20A521L.2	3	-	3	3	-	-	-	-	-	-	-	3	3	-	-
20A521L.3	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A521L.4	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A521L.5	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Discrete Mathematics
Category BSC
Couse Code 20AC33T

Year II B. Tech
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce the concepts of mathematical logic.
- To introduce generating functions and recurrence relations
- To state the definitions of binary relation, equivalence relation, equivalence class, partition, functions and group theory.
- To use graph Theory for solving Engineering problems.
- To introduce the concepts of trees.

Unit 1 Mathematical logic 12

Connectives, negation, conjunction, disjunction, conditional and bi-conditional, well-formed formulae, tautologies, equivalence of formulae, duality, tautological implications, principal disjunctive and conjunctive normal forms, inference calculus, rules of inference, indirect method of proof, automatic theorem proving.

Learning Outcomes: At the end of the unit, the student will be able to

- Find equivalence formulae, implementation of logic for mathematical proofs (L1)
- Apply inference theory to verify the consistence of data (L3)
- Utilize automatic theorem to the data (L3)

Unit 2 Recurrence relations 9

Generating functions of sequences, calculating coefficients of generating functions, Recurrence relations - Solving recurrence relations by substitution and generating functions, method of characteristic roots, Solutions of non-homogeneous recurrence relations

Learning Outcomes: At the end of the unit, the student will be able to:

- Define recurrence relations of the sequences (L1)
- Solve homogeneous linear recurrence relations (L3)
- Determine complementary function and particular integral for non-homogeneous linear recurrence relations (L3)

Unit 3 Relations and functions 10

Relations and functions: Properties of binary relations in a set, relation matrix and the graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, partial ordering, Hasse diagram, functions - composition of functions, inverse functions and recursive functions.

Algebraic structures: algebraic systems, simple algebraic systems and general properties, semi groups and monoids, groups, subgroups, homomorphism, isomorphism.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the properties of relations and functions (L2)
- Test the given algebraic structure is a group or not (L2)

Unit 4 Graph theory 9

Definitions, finite and infinite graphs, incidence and degree, isolated pendant vertices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Euler graphs, Euler graph theorem, operations on graphs, arbitrarily traceable Euler graphs, Hamiltonian paths and circuits, travelling salesman problem

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify different graphs and their properties (L3)
- Describe the different types of graphs (L2)
- Construct Euler and Hamiltonian graphs (L3)

Unit 5 Trees **8**

Some properties of trees, pendant vertices, distance and centers, rooted and binary trees, spanning trees, fundamental circuit, shortest spanning trees, Kruskal's algorithm

Learning Outcomes: At the end of the unit, the student will be able to:

- Construct the spanning tree and binary tress from graphs (L3)
- Build minimal spanning tree by using different algorithms (L3)

Prescribed Textbooks:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997. (Units 1 & 3)
2. J.L. Mott, A. Kandel and T. P. Baker, Discrete Mathematics for computer scientists & Mathematicians, 2/e, Prentice Hall of India Ltd, 2012. (Unit 2)
3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006. (Units 4 and 5).

Reference Books:

1. K. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill, 2009.
2. R. Johnsonbaugh, Discrete mathematics, 7/e, Pearson Education, 2008.

Course Outcomes:

	Upon successful completion of this course, the student will be able to	Blooms Level of Learning
1.	Understand and apply the logic statements and express logical sentences in terms of logical connectives	L2, L4
2.	Analyze the various types of recurrence relations and apply the methods to find out their solutions	L2, L3
3.	Understand sets, relations, functions, and discrete structures.	L2
4.	Apply graph theory concepts in core subjects such as data structures and network theory effectively	L3
5.	Apply the properties of Trees in Engineering applications.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC33T.1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC33T.2	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC33T.3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC33T.4	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC33T.5	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Management Science
Category HSMC
Course Code 20AE32T

Year II B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the basic concepts of Management and Organization Structures
- To understand the HRM practices and process
- To give a clear idea about the Plant Layout, Methods of Production, PERT, and CPM
- To Understand the concepts of financial management, and Investment Analysis
- To understand the concepts of Marketing

Unit 1 Management and Organization Structure 14

Meaning, Nature, Concept and Importance of Management, Functions of Management, Levels of Management, Evolution of Management Thought: Taylor Scientific Management, Fayol's Administrative Management, Roles and Skills of Manager, Principles of Organization, Forms of Organization Structure: Line, Line and Staff, Functional, Divisional and Matrix Organizations.

Learning Outcomes: At the end of the unit, the student will be able to:

- Remember the basic concepts of Management like functions, levels and evolution. (L1)
- Explain roles and skills of Manager, principles and structures of organization. (L2)

Unit 2 Human Resources Management 8

Definition, Significance of HRM, Functions of HRM, HR Planning Process, Job Analysis, Job Design, Recruitment and Selection, Placement, Induction and Training, Performance Appraisal, Compensation, Industrial Relations.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply HRM practices and process in their working places (L3)
- Interpret job analysis and job design (L3).

Unit 3 Operations Management & Project Management 12

Introduction and Functions of Operations, Factors affecting Plant Location, Methods of Production (Job, Batch and Mass Production), Objectives of Inventory Management, Factors influencing Inventory Management and Control, Inventory Control Techniques: EOQ, ABC Analysis, JIT. Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM).

Learning Outcomes: At the end of the unit, the student will be able to:

- State the functions of operations, basic methods of Production and inventory management objectives. (L1)
- Apply knowledge in Methods of Production, PERT, and CPM (L3)

Unit 4 Financial Management 8

Objectives, Scope, Functions of Financial Management, Techniques of Investment Analysis -Pay Back Period, Accounting Rate of Return, Net Present value and Profitability Index (theory only), Need of Working Capital, Cost Concepts, Sources of Financing.

Learning Outcomes: At the end of the unit, the student will be able to:

- Differentiate the basic cost concepts (L4).
- Compare techniques of Investment Analysis (L4)

Unit 5 Marketing Management **8**

Definitions of Marketing, Core Concepts of Marketing, Bases of Market Segmentation, Marketing Mix, Product Levels, Product Life Cycle, Pricing Objectives, Pricing Methods, Role of Marketing Channels, Channel Design Decisions.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand Marketing concepts (L1)
- Explain market segmentation and pricing methods (L2)
- Use channel design decision in practical life (L3)

Prescribed Textbooks:

1. Principles and Practice of Management by L M Prasad., Sultan Chand & Sons Publisher.
2. Human Resource Management, K. Aswathappa, 4th Edition, THM 2006.
3. Production and Operation Management by K Aswathappa & K. Sridhara Bhat, Himalaya Publishing House.
4. Panday, I.M, Financial Management- Vikas Publishing House, New Delhi.
5. Marketing Management By Philip Kotler, Kevin Lane Kellar, 12/e, Pearson 2007

Reference Books:

1. Operations Management by James R Evans & David A Coller, Thompson Press Publications.
2. Management Science by Aryasri, McGraw Hill Education India, ISBN: 9780070090279.
3. Robbins S P, management PHI.
4. Management Sixth Edition by James A F Stoner, R Edward Freeman, Daniel R Gilbert (Pearson)

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the basic concepts of Management and Organization Structures.	L1
2. Evaluate the skills require to become successful employee.	L5
3. Apply knowledge in Methods of Production, PERT, and CPM	L1
4. Understand the basic cost concepts and financial decisions in Investment	L3
5. Understand Marketing concepts, segmentation and Pricing Methods	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AE32T.1	2	-	-	-	-	-	-	-	2	-	2	-	-	-	-
20AE32T.2	-	-	-	-	-	-	-	-	3	-		-	-	-	-
20AE32T.3	-	-	-	2	-	-	-	-	-	-	3	-	-	-	-
20AE32T.4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
20AE32T.5	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Database Management Systems
Category PCC
Couse Code 20A531T

Year II B. Tech
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the role and uses of DBMS in an organization.
- To understand fundamental concepts of Database Management Systems like database design, database languages, and database-system implementation.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization techniques.
- To explain the principle of transaction management design.

Unit 1 **9**

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Data Storage and Querying, Transaction Management, Data Base Architecture, Database Users and Administrators, History of Database Systems.

Learning Outcomes: At the end of the unit, the student will be able to

- Explain the Features of Database Management Systems, Architecture of database systems.(L2)
- Define the role of database users (L1)

Unit 2 **10**

Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Case study: The Internet Shop.

The Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Data Base Design: ER to Relational.

Learning Outcomes: At the end of the unit, the student will be able to:

- Develops an Entity-Relationship model based on user requirements.(L5)
- Defines the basics of the relational data model. (L1)

Unit 3 **9**

SQL and PL/SQL: Introduction to SQL, Data Definition Commands, Data Manipulation Commands, Select Queries, Virtual Tables: Creating View, Altering View, Updating View, Destroying View, Relational Set Operators, SQL Join Operators, Sub Queries and Correlated Queries, Aggregate Functions, Procedural SQL: Stored Procedures, Stored Functions, Triggers, Cursors.

Learning Outcomes: At the end of the unit, the student will be able to:

- Designs SQL queries to create database tables and make structural modifications. (L5)
- Define and enforces integrity constraints on a database. (L1)

Unit 4 **12**

Introduction to Schema Refinement: Problems Caused by Redundancy, Decompositions, Problems Related to Decomposition, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, BCNF, Properties of Decomposition: Lossless Join Decomposition, Dependency Preserving Decomposition, Multivalued Dependencies, 4 NF.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describes Functional Dependency and Functional Decomposition. (L2)
- Applies various Normalization techniques for database design improvement. (L3)

Unit 5 **9**

ACID Properties: Consistency and Isolation, Atomicity and Durability, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control, Performance of Locking, Transaction Support in SQL.

Learning Outcomes: At the end of the unit, the student will be able to:

- Applies transaction processing mechanisms in relational databases.(L3)
- Explain the Concurrency Control and Recovery Algorithms. (L2)

Prescribed Text Books:

1. Silberschatz, Korth, Sudarshan, Database System Concepts. McGraw Hill, 5th Edition.
2. C.J.Date, Introduction to Database Systems. Pearson Education.

Reference Books:

1. RaghuRamaKrishnan, Johannes Gehrke, Database Management Systems, McGraw Hill, Third Edition.
2. Elmasri,Navate, Fundamentals of Database Systems. Pearson Education.
3. Peter Rob, A. Ananda Rao, Carlos Coronel, Database Management Systems, CENGAGE Learning.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Memorize and recall the basic concepts of Database Systems to examine the applications of database systems.	L1
2. Demonstrate an Entity-Relationship (E-R) model from specifications and to convert the transformation of the conceptual model into corresponding logical data structures.	L2
3. Illustrate database concepts in structure query languages.	L3
4. Analyze the problems with redundancies and eliminate redundancies in a database schema using normalization.	L4
5. Judge the need of concurrency control in transaction management concepts in database systems.	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A531T-1	-	3	-	3	3	-	-	-	-	-	-	-	3	-	-
20A531T-2	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531T-3	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531T-4	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531T-5	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Object Oriented Programming using Java
Category PCC
Couse Code 20A532T

Year II B.Tech
Semester I Semester
Branch CSE, AI &DS, and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to
- Understand and apply the concepts of OOP's using java and create console-based applications.
- Understand, apply and analyze the reusability concepts like inheritance and packages.
- Understand, apply and analyze the concepts interfaces, and exception handling.
- Understand and implement the multi-threading applications developed using Java.
- Understand and apply the Generic Programming and Lambda Expressions.
- Apply and analyze the Collection Framework.

Unit 1 The Java Language 9

The History and Evolution of Java, The Byte code, The Java Buzzwords, The Evolution of Java, Java SE 8. Object-Oriented Programming -Two Paradigms, Abstraction, The three OOP Principles, A First Simple Program-Entering the Program, Compiling the Program, Running the Program, Overview of Java, Data Types, Variables, Arrays, operators and control statements.

Classes and Objects: Class Fundamentals, Declaration of Objects, Assigning Object Reference Variables, Introducing Methods, Adding a Method to the Class, Returning a Value, Adding a Method That Takes Parameters, Constructors, Parameterized Constructors, The this Keyword, Instance Variable Hiding, Garbage Collection, The finalize() Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion.

Learning Outcomes: At the end of the unit, the student will be able to
- Use the data types, operators and control statements in Java (L2)
- Uses of classes, constructors, and methods and Objects; How to apply these facilities in Java Programming (L3)

Unit 2 Access Controls and Inheritance 9

Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class.

Inheritance: Inheritance Basics, Member Access and Inheritance, A Practical Example, Accessing super class members, Usage super key word, Creating a Multilevel Hierarchy, Accessing Constructors in inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance. Object Class.

Learning Outcomes: At the end of the unit, the student will be able to:
- Use the Access Controls; How to apply these facilities in Java Programming (L3)
- Demonstrate the importance of Inheritance and Accessing members of super and subclasses (L3)

Unit 3 Packages, Interfaces and Exception Handling 9

Packages and Interfaces: Packages, Defining a Package, Finding Packages and CLASSPATH, A Short Package Example, Access Protection, an Access Example, Importing Packages.

Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended, Default Interface Methods, Default Method Fundamentals, A More Practical Example, Multiple Inheritance Issues, Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Displaying a Description of an Exception, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Built-in Exceptions, Creating Your Own Exception Subclasses.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define packages and with their importing package in other classes (L2)
- Define interfaces and implementing interfaces in a class (L2)
- Demonstrate and classify error and exception handling (L3)

Unit 4 Multithreaded Programming and Generics 9

Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Messaging, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Choosing an Approach, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization Using Synchronized Methods, The synchronized Statement, Interthread Communication.

Generics: What Are Generics, Generics Work Only with Reference Types, A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Using Wildcard Arguments, Bounded Wildcards Creating a Generic Method, Generic Constructors, Generic Interfaces, Raw, Generic Class Hierarchies, Using a Generic super class, A Generic Subclass, Run-Time Type Comparisons Within a Generic Hierarchy, Casting, Overriding Methods in a Generic Class, Type Inference with Generics.

Learning Outcomes: At the end of the unit, the student will be able to:

- Acquire knowledge on multithreading and apply the same in developing real time java based applications (L1)
- Identify and apply the importance of Generics (L2)

Unit 5 Lambda Expressions and The Collection of Framework 9

Lambda Expressions: Introducing Lambda Expressions, Lambda Expression Fundamentals, Functional Interfaces, Some Lambda Expression Examples, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments, Lambda Expressions and Variable Capture.

java.util Package: The Collections Framework: Collections Overview, The Collection Interfaces: The Collection Interface, The List Interface; The Collection Classes: The ArrayList Class, The LinkedList Class, Accessing a Collection via an Iterator, Using an Iterator, The For-Each Alternative to Iterators, Storing User-Defined Classes in Collections, Working with Maps, The Map Interfaces, The Map Classes, The Collection Algorithms. Arrays, StringTokenizer.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and apply the Lambda Expressions(L3)
- Understand and apply the Collection of Framework (L3)
- Understand and Use of Collection Algorithms with Collection classes (L3)

Prescribed Text Books:

1. Herbert Schildt. Java. The complete reference, TMH, 9th Edition.

Reference Books:

1. J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education. 6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development,
4. Cay.S.Horstmann and Gary, Cornell, Core Java 2, Vol. 1, Fundamentals, Pearson Education. 7th Edition,
5. Cay.S.Horstmann and Gary Cornell Core Java 2, Vol 2, Advanced Features, Pearson Education. 7th Edition
6. P. Radha Krishna, Object Oriented Programming through Java, University Press.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand and apply fundamentals of object-oriented programming features through Java Programming Language.	L1, L3
2. Apply and analyze reusability concepts like Inheritance in real time applications developed using JAVA	L3, L4
3. Acquire knowledge on packages, interfaces, exception handling and apply the same in developing real time java based applications.	L1, L3
4. Acquire knowledge on multithreading, Generic Programming and apply the same in developing real time java based applications.	L1, L3
5. Understand and apply the concepts like Lambda Expressions and Collection framework.	L1, L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A532T-1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
20A532T-2	-	3	3	2	-	-	-	-	-	-	-	-	3	-	2
20A532T-3	3	3	3	2	-	-	-	-	-	-	-	-	3	-	2
20A532T-4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
20A532T-5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Computer System Architecture
Category PCC
Couse Code 20A533T

Year II B. Tech
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will

- Illuminate the student to understand the basic concepts of digital number systems and their conversions
- Allow the students to Design and analyze combinational and sequential logic circuits through formulation of logic functions, Boolean algebra minimization
- Impart the students to understand the internal organization and operations of a computer
- Enable the students to acquire knowledge about the concepts of processor logic design and memory organization
- Allow the students to familiarize the concepts related to IO organization.

Unit 1 Basic Structure of Computers **9**

Computer Types, Functional units, Basic operational concepts, Bus structures, Data Representation: Binary Numbers, Fixed Point Representation. Floating – Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.

Learning outcomes: At the end of this unit, the student will be able to

- Understand the advantages of using different number systems (L2)
- Describe different binary codes (L2)
- Summarize representation methods of negative numbers (L2)

Unit 2 Digital Logic Circuits **9**

Digital Logic Circuits - I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions, Combinational Circuits.

Digital Logic Circuits - II: Flip-Flops, Registers, Shift Registers, Binary counters, Decoders, Multiplexers, Programmable Logic Devices.

Learning outcomes: At the end of this unit, the student will be able to

- Apply basic laws & De Morgan's theorems to simplify Boolean expressions (L3)
- Summarize sum-of-products and product-of-sum representations (L2)
- Demonstrate digital circuits using Karnaugh Map (L3)

Unit 3 Computer Arithmetic and Instruction Set & Addressing **9**

Computer Arithmetic: Algorithms for fixed point and floating point addition, subtraction, multiplication and division operations, Hardware Implementation of arithmetic and logic operations.

Instruction Set & Addressing: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats, Basic Machine Instructions.

Learning outcomes: At the end of the module the student will be able to

- Apply fixed and floating point algorithms to perform arithmetic operations (L3)
- Interpret different types of computer instructions (L2)
- Explain the phases in instruction cycle (L2)
- Make use of various addressing modes (L3)

Unit 4 Processor Organization and Memory Organization **9**

Processor Organization: Introduction to CPU, Register Transfers, Execution of Instructions, Multiple Bus Organization, Hardwired Control, Micro programmed Control

Memory Organization: Concept of Memory, RAM, ROM memories, memory hierarchy, cache memories, virtual memory, secondary storage, memory management hardware.

Learning outcomes: At the end of this unit, the student will be able to

- Describe about Central Processing Unit (L2)
- Compare and contrast different types of memories (L4)
- Explain mapping techniques of cache memory (L2)

Unit 5 Input / Output Organization **9**

Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Direct memory access, buses, Interface Circuits, Standard I/O Interfaces.

Learning outcomes: At the end of the module the student will be able to

- Outline the concept of Input-output interface.(L2)
- Compare the modes of data transfer techniques (L2)
- Illustrate the working of Direct memory Access (L2)

Prescribed Text Books:

1. Computer Organization – Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, McGraw Hill
2. Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India
3. Computer System Architecture – M.Moris Mano, 3rdEdition, Pearson

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearon.
2. Computer- organization and Design- David A. Paterson and John L. Hennessy-Elsevier
3. Fundamentals or Computer Organization and Design, - Sivarama Dandamudi Springer Int. Edition
4. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Identify the basic structure and functional units of a digital computer	L1
2. Solve problems based on computer arithmetic	L1,L3
3. Design, Analyze and evaluate different digital circuits using Boolean algebra	L1, L4
4. Understand instruction structure and Analyze the effect of addressing modes on the execution time of a program	L2, L4
5. Understand concepts related to Processor, memory organization and Select appropriate interfacing standards for I/O devices	L1, L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A533T-1	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
20A533T-2	3	3	3	2	3	-	-	-	2	-	-	3	3	-	2
20A533T-3	3	3	-	-	-	1	-	-	-	-	3	3	3	-	2
20A533T-4	-	3	-	3	3	-	-	-	3	-	-	3	-	-	3
20A533T-5	-	3	3	2	-	-	-	-	3	-	2	3	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Database Management Systems Lab
Category PCC(LAB)
Course Code 20A531L

Year II B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To understanding Conceptual Database Management systems.
- To understand the principles of Data Modelling using Entity relationships to Database design.
- To understand SQL, and its syntax for Various Key Constraints.
- To use aggregate functions date time functions.
- To use PL/SQL for implementing object level data

List of Programs

Exercise 1:

Draw Relational Databases and ER Diagrams for the following applications.

a. Student Information System, Student (Student No, Student Name, Address, Mobile No, Email ID, Institute Name, Branch Name, Fee, Mark1, Mark2, Mark3, Mark4, Mark5,TotalMarks,Percentage,Grade)
b. Employee Information System, Employee (Employee ID, Employee Name, Address, Mobile No, Email ID, Organization Name, Employee Designation, Basic Salary, DA, HRA, Gross Salary, Deductions, Net Salary)
c. Customer Information System Customer (Customer ID, Customer Name, Address, Mobile No, Email ID, Shop Name, Product Code, Product Name, Quantity, Cost per Unit, Total Bill, Discount, Net Bill)

Learning Outcomes: At the end of the module, the student will be able to:

- Draw Relational and ER Diagrams for applications. (L3)

Exercise 2:

Write SQL queries to CREATE TABLES for various databases using DDL commands (i.e. CREATE, DESCRIBE, ALTER, DELETE, DROP).

Exercise 3:

Write SQL queries to MANIPULATE TABLES for various databases using DML commands (i.e. INSERT, SELECT, UPDATE, DELETE, TRUNCATE).

Learning Outcomes: At the end of the module, the student will be able to:

Implement DDL and DML commands and use them (L5)

Exercise 4:

Write SQL queries to create VIEWS for various databases (i.e. CREATE VIEW, UPDATE VIEW, ALTER VIEW, and DELETE VIEW).

Exercise 5:

Write SQL queries to perform RELATIONAL SET OPERATIONS (i.e. UNION, UNION ALL, INTERSECT, MINUS, CROSS JOIN, NATURAL JOIN).

Learning Outcomes: At the end of the module, the student will be able to:

- Implement Views and RELATIONAL SET OPERATIONS and use them (L5)

Exercise 6:
Write SQL queries to perform SPECIAL OPERATIONS (i.e. ISNULL, BETWEEN, LIKE, IN, EXISTS)
Exercise 7:
Write SQL queries to perform JOIN OPERATIONS (i.e. CONDITIONAL JOIN, EQUI JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN)
Learning Outcomes: At the end of the module, the student will be able to:

- Implement SPECIAL and JOIN OPERATIONS and use them (L5)

Exercise 8:
Write SQL queries to perform AGGREGATE OPERATIONS (i.e. SUM, COUNT, AVG, MIN, MAX).
Exercise 9:
Write SQL queries to perform ORACLE BUILT-IN FUNCTIONS (i.e. DATE, TIME).
Exercise 10:
Write SQL queries to perform KEY CONSTRAINTS (i.e. PRIMARY KEY, FOREIGN KEY, UNIQUE NOT NULL, CHECK, and DEFAULT).
Learning Outcomes: At the end of the module, the student will be able to:

- Implement AGGREGATE ,ORACLE BUILT-IN FUNCTIONS and KEY CONSTRAINTS and use them(L5)

Exercise 11:
Write PL/SQL programs for

a. Calculating the factorial of given number.
b. Finding the given number is Prime Number or not.
c. Displaying the Fibonacci series up to an integer.

Exercise 12:

a. Write PL/SQL program to implement Stored Procedure on table.
b. Write PL/SQL program to implement Stored Function on table.

Exercise 13:
Write PL/SQL program to implement Trigger on table.
Exercise 14:
Write PL/SQL program to implement Cursor on table
Learning Outcomes: At the end of the module, the student will be able to:

- Execute PL/SQL programs (L5)

Prescribed Text Books:

1. Raghurama Krishnan, Johannes Gehrke, Data base Management Systems.Tata McGraw Hill.
2. Peter Rob, AnandaRao and Carlos Corone, Database Management Systems. Cengage Learning.

Reference Books:

1. Rick F.VanderLans, Introduction to SQL. Pearson Education.
2. B.RosenZweig and E.Silvestrova, Oracle PL/SQL. Pearson Education.
3. Steven Feuerstein. OraclePL/SQL Programming.
4. Dr. P. S. Deshpande, SQL&PL/SQL for Oracle 10g. Black Book, DreamTech.
5. J. J. Patrick, SQL fundamentals. Pearson Education.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Draw ER-Diagrams for Various Applications	L4
2. Design database with Key Constraints and use the SQL commands such as DDL, DML, DCL, TCL to access data from database objects.	L6
3. Analyze Views in order to retrieve information from the different kinds of the user.	L4
4. Implement Relational, Special, Join Operators, Oracle built-in functions and Aggregate functions.	L3
5. Execute PL/SQL Programming including stored procedures, stored functions, cursors, packages.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A531L.1	-	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20A531L.2	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531L.3	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531L.4	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3
20A531L.5	-	3	3	3	3	-	-	-	-	-	-	-	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Object Oriented Programming Using Java Lab
Category PCC (LAB)
Course Code 20A532L

Year II B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This Course will be able to

- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.,
- Understand fundamentals of Object-Oriented Programming in Java, Including defining classes, Invoking methods, using libraries, etc.,
- Aware of the important topics and principles of software development.
- Have the ability to write a computer program to solve specified problems.
- Use the Java SDK environment to create, debug and run simple Java Programs.

List of Programs

Exercise 1:
a) Write a Java program to display Fibonacci series between 1 to n.
b) Write a Java program to perform the arithmetic operations using switch case statement.
c) Write a Java program to calculate sum of 5 subjects and find percentage.
Exercise 2:
a) Write a Java program to display all strong numbers between 1 to n.
b) Write a Java program to find multiplication of two matrices.
c) Write a Java program to convert temperature from Centigrade to Fahrenheit and Fahrenheit to Centigrade
Learning Outcomes: At the end of the module, the student will be able to:

- Use variables, data types and operators (L2)
- Write programs that can take input and prints output in different forms and able to use control statements (L3)

Exercise 3:
a) Write a Java program to implement the access control.
b) Write a Java program to implement the constructor overloading.
c) Write a Java program to implement the method overloading.
Exercise 4:
a) Write a Java program to find the factorial of a given number using recursion.
b) Write a Java program to find whether the given string is palindrome or not.
c) Write a Java program to arrange the n number of list of string in an order.
Learning Outcomes: At the end of the module, the student will be able to:

- Define class and Object Orientation Concepts are applied and analyzed (L3, L4)

Exercise 5:
a) Write a Java program to implement the method overriding.
b) Write a Java program to implement the multilevel inheritance.
c) Write a Java program to implement dynamic method dispatch.

Exercise 6:
a) Write a java program for abstract class implementation.
Note: - class Shape that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides() that shows the number of sides in the given geometrical figures.
b) Write a Java program to implement the package concept.
c) Write a Java program to implement the multiple inheritance using interfaces.
Learning Outcomes: At the end of the module, the student will be able to:

- Implement of inheritance and their forms, interfaces and package(creation and importing) (L5)

Exercise 7:
a) Write a Java program to implement the exception handling mechanism.
b) Write a Java program to implement the nested try statement.
c) Write a Java program to implement the own exception class.
Learning Outcomes: At the end of the module, the student will be able to:

- Illustrate the exception handling mechanism (L3)
- Analyze and apply exception handling with try, catch, finally, throw and throws keywords (L4)

Exercise 8:
a) Write a Java program for multi-thread implementation.
Note: First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
b) Write a Java program to implement producer consumer problem using inter-thread communication mechanism.
c) Write a Java program to use the isAlive() and join() methods.
Learning Outcomes: At the end of the module, the student will be able to:

- Thread creation and multi-thread implementation (L3)

Exercise 9: Any four programs on Generic Programming.
Learning Outcomes: At the end of the module, the student will be able to:

- Implement generic programming (L5)

Exercise 10: Any four programs on Lambda expressions.
Learning Outcomes: At the end of the module, the student will be able to:

- Implement Lambda Expressions (L5)

Exercise 11:
a) Write a Java program to display the sum of all the integers of given line of integers using StringTokenizer class.
b)Write a program to implement linkedlist
Learning Outcomes: At the end of the module, the student will be able to:

- Implementation of Collection Frame Work interfaces and Classes (L5)

Prescribed Text Books:
1. H.M.Dietel and P.J.Dietel, Java How to Program 6th Edition, Pearson Education/PHI
2. Y.DanielLiang,Introduction to Java programming, Pearson Education, 6thEdition.
3. Cay Horstmann,Big Java, 2nd edition, Wiley Student Edition, Wiley India Private Limited.
4. Herbert Schildt.Java. The Complete Reference, TMH. 9thEdition.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Design and implement the programs to demonstrate classes, objects and encapsulation.	L1, L3
2. Demonstrate and implement the principles of inheritance, polymorphism, constructor overloading, and method overloading	L1, L3
3. Understanding the use of packages, creation of packages, importing the packages and the importance of the collection of framework	L1, L5
4. Implementation of multithread programming, Thread Priority, Exception Handling and Creation of own Exceptions.	L1, L5
5. Implement and demonstrate generic programming, lambda expressions and collection of framework.	L1, L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A532L -1	1	-	3	-	3	3	3	1	3	-	3	-	3	-	2
20A532L - 2	-	-	3	3	3	-	3	-	-	-	3	-	3	-	2
20A532L - 3	-	-	3	3	3	3	3	-	3	-	3	-	3	-	2
20A532L - 4	-	-	3	-	3	3	3	1	3	-	3	-	3	-	2
20A532L - 5	-	-	3	-	3	3	-	1	3	-	3	-	3	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Computer System Architecture Lab
Category PCC (LAB)
Course Code 20A533L

Year II B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This Course will be able to

- Understand the basics of logic gates.
- Know basic combinational circuits and verify their functionalities
- Apply the design procedures to design basic sequential circuits
- Learn about counters and Shift Registers
- Understand the basic digital circuits and to verify their operation

List of Programs

Exercise 1:
To verify the truth table of basic logic gates AND, OR, NOT, NAND, NOR, XOR, XNOR and their realization using universal logic gates.

Exercise 2:
a) To realize Half adder, Full adder, Half Subtractor and Full Subtractor using logic gates.
b) To realize Half Adder, Full adder, Half subtractor and Full subtractor using NAND gate.

Learning Outcomes: At the end of the module, the student will be able to:

- Use of various logic gates and their functionality (L2)
- Implement adders and subtractors using different logic gates (L5)

Exercise 3:
a) To implement 2-to-4 Decoder and 3-to-8 Decoder using logic gates.
b) To implement Full adder using 3-to-8 Decoder.

Exercise 4:
a) To implement 2-to-1, 4 to 1, 8 to 1 multiplexer using logic gates.
b) To implement Full adder using 4 to 1 multiplexer.

Learning Outcomes: At the end of the module, the student will be able to:

- Implement decoders and multiplexers and their functionality (L5)

Exercise 5:
a) To Realize and verify the truth table of SR, JK, D and T flip flop.

Exercise 6:
a) Create a 4-bit ripple carry adder circuit using half adders and full adders and test it by giving proper input.
b) Design a 4-bit carry lookahead adder circuit using half adders and full adders and test it by giving proper input.

Learning Outcomes: At the end of the module, the student will be able to:

- Use various flipflops and their functionality (L2)
- Implement ripple carry adder and carry lookahead adder (L5)

Exercise 7:
a) Design a 5-bit Shift Registers using the flip-flops and check the output.

Exercise 8:
a) Create a combinational multiplier circuit to multiply two 4-bit binary numbers. Use half adders, full adders and logic gates and test it by giving proper input.

Learning Outcomes: At the end of the module, the student will be able to:

- Implement shift registers and multiplier circuits (L5)

Exercise 9:

a) Design a 4-bit Booth's multiplier circuit
b) Design a 4-bit ALU comprising only the AND, OR, XOR and Add operations.

Learning Outcomes: At the end of the module, the student will be able to:

- Implement Booth's Multiplier Circuit (L5)
- Design ALU (L5)

Exercise 10:

a) Design a 4X3 RAM memory which will have 4 words each of 3 bits using binary RAM cells, decoder with enable, OR gates and test it by giving proper input.

Learning Outcomes: At the end of the module, the student will be able to:

- Design Memory (L5)

Exercise 11:

a) Design a CPU with single instruction
b) Design a CPU with more instructions

Exercise 12:

a) To understand the Karnaugh Maps.

Learning Outcomes: At the end of the module, the student will be able to:

- Design CPU (L5)
- Understand the use of Karnaugh Maps (L2)

Prescribed Text Books:

1. Stephen Brown, ZvonkoVranesic, "Fundamentals of Digital Logic with Verilog Design", Tata McGraw Hill Publishing Company Limited, Second Edition.
2. M Morris Mano, Micheal D Ciletti "Digital Design with an introduction to the verilog HDL", Pearson Education, Fifth Edition, 2013
3. Donald D Givone, "Digital Principles and Design", Tata McGraw Hill Publishing Company Limited, 2003.
4. http://vlabs.iitkgp.ac.in/coa/#

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Develop Boolean equations and truth tables for synthesis using different logic gates	L3
2. Design combinational and sequential logic circuits.	L5
3. Develop various shift registers and Counters	L5
4. Design and construct synchronous, asynchronous counters and special type of counters.	L1, L5
5. Design and construct ALU, CPU and Memory	L1, L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A533L-1	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
20A533L-2	3	3	3	2	3	-	-	-	2	-	-	3	3	-	2
20A533L-3	3	3	-	-	-	1	-	-	-	-	3	3	3	-	2
20A533L-4	-	3	-	3	3	-	-	-	3	-	-	3	-	-	3
20A533L-5	-	3	3	2	-	-	-	-	3	-	2	3	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Advanced Python Programming
Category SC-Skill Oriented Course
Couse Code 20A3031L

Year II B.Tech
Semester I Semester
Branch AI & DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will make the students
- Able to learn NumPy –Numerical Python Library.
- Able to learn Pandas –Data Analysis Library.
- Able to learn Matplotlib–Data Visualization Library
- Able to work with SQLite Manager and SQL Data Base Engine.
- Able to make use of Django Framework

Module 1 Introduction to NumPy Library: 9

NumPy: Littlie History, NumPy Installation, Ndarray: The Heart of Library, Basic Operations, Indexing, Slicing, Iterating, Conditions and Boolean Array, Shape Manipulation, Array Manipulations, General Concepts, Structured Arrays, Reading and Writing Array data on Files.

Learning Outcomes: At the end of the unit, the student will be able to
- Use Numpy module in Data Analysis and Data Science (L3)
- Implement N-dimensional Arrays. (L3)

Module 2 Introduction to Pandas Library: 9

Pandas: The Python Data Analysis Library, Installation of Pandas, Introduction to Pandas Data Structure, Other functionalities on Indexing, Operations Between Data Structures, Function Application and Mapping, Sorting and Ranking, Correlation and Covariance, Not a Number Data, Hierarchical Indexing and Leveling, Reading and Writing Data in CSV or Text Files.

Learning Outcomes: At the end of the unit, the student will be able to
- Use Pandas Library in Data Analysis and Data Science. (L3)
- Perform reading and writing data from different types of Sources. (L3)

Module 3 Data Visualization with MatplotLib: 9

The Matplotlib Library, Installation, Matplotlib Architecture, Pyplot,The Plotting Window, Using the kwargs , Adding Elements to the chart, Saving your charts, Handling Data Values, Chart Typology, Line Charts, Scatter charts, Histograms, Bar charts, Pie charts, Advanced Charts, The Mplot3D Toolkit, Multi-Panel Plots.

Learning Outcomes: At the end of the unit, the student will be able to
- Use matplotlib for Data Visualiztion. (L3)
- Represent the data in different visualization charts. (L3)

Module 4 Handling Relational databases: 9

SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, The Movie List Program.

Learning Outcomes: At the end of the unit, the student will be able to
- Understand how data is stored across multiple tables and manipulate tables in data base using Python. (L2)
- Make use of SQLite Manager.(L3)

Module 5 Django Framework: **9**

Building a Blog Application, Enhancing your blog with advanced features, Extending your blog Application.

Learning Outcomes: At the end of the unit, the student will be able to

- Use Django Framework (L3)
- Create web applications using Django with python (L6)

Prescribed Text Books:

1. Python Data Analytics,With Pandas, NumPy, and Matplotlib, Second Edition by Fabio Nelli.
2. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.
3. Django2 with Example, builds powerful and reliable web applications from scratch by Antonio Mele.

Reference Books:

1. Python data Science Handbook,Essential tool for working with data by Jake VanderPlas.
2. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython 2nd Edition, Kindle Edition by Wes McKinney.
3. Python All-in-one by John Shovic and Alan Simpson.
4. Core Python Programming, R. Nageswara Rao, Dream Tech Press (Wiley India), 2017 Edition

Online Reference:

1. https://docs.scipy.org/doc/scipy/reference/tutorial/
2. https://jakevdp.github.io/PythonDataScienceHandbook/
3. https://docs.python.org/3/tutorial/index.html

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Apply numpy-Numerical Python Library in Data Analytics & Data Science	L3
2. Apply Pandas Library in Data Analysis and Data Science	L3
3. Construct Data visualization charts using matplotlib	L5
4. Understand SQL Statements for Data Manipulation and make use of SQLite Manager.	L2, L3
5. Create web applications using Django Framework	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3031L.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3031L.2	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3031L.3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3031L.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
20A3031L.5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	Life Sciences for Engineers
Category	MC
Course Code	20AC34T
Year	II B. Tech.
Semester	I Semester **(**CSE, CE and AI&DS**)**

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	0

Course Objectives:

- To introduce the origin of life.
- To provide the basis for classification of living organisms.
- To describe the transfer of genetic information**.**
- To introduce the techniques used for modification of living organisms**.**
- To describe the applications of biomaterials

Unit 1 The Living World 8

Nature and Scope of Biology, Origin and Evolution of Life, Systematics, Classification of living organisms, Viruses, Prokaryotes and Eukaryotes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the concept of origin of life. (L2)
- Classify the different types of organisms. (L2)

Unit 2 Cell and Cell Division 8

Plant cell and Animal cell, Structure of the cell: Nucleus, Ribosome's. Molecules of the cell: Nucleic acids, Cell Cycle: Mitosis, Meiosis.

Learning Outcomes: At the end of the unit, the student will be able to:

- Discusses the structure and function of the cell. (L2)
- Differentiate the stages of cell division. (L2)

Unit 3 Physiology of Plants and Animals 12

Photosynthesis, Respiration: Types of respirations, Glycolysis, TCA Cycle, Nervous system, Endocrine system in animals.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the importance of photosynthesis and respiration process. (L1)
- Explain the vital role of Co-ordinate system in animals. (L2)

Unit 4 Genetics 12

Genetic basis of Inheritance, Mendel's laws, Human genetic disorders: Hemophilia, Colour Blindness, Autosomal abnormalities: Down's, Patau's and Edward's syndromes. Genetic Engineering: Recombinant vaccines, Basis of DNA finger Printing, Animal cloning.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define the gene and its importance in heredity. (L1)
- Describe the effects of gene mutations. (L2)
- Apply the concept of genetic engineering in development of vaccines. (L3)

Unit 5 Biology in Human Welfare 8

Parasitism, *Plasmodium vivax, Wuchereria bancrofti*, Health and Disease: Bacterial, Viral diseases: HIV, Biomedical technologies: X-Ray, CT- Scan, MRI- Scan, PET-Scan.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the causes of pathogenic diseases and effects on human health. (L1)
- Explain the importance of biomedical techniques. (L2)

Prescribed Textbooks

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011

Reference Books

1. Alberts Et.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012
4. PS Verma | VK Agarwal.Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand Publishing, 2004.

Course Outcomes:	Blooms Level
Upon successful completion of this course, the student will be able to	of Learning
1. Explain stages of Systematics.	L2
2. Summarize application of biomolecules.	L2
3. Identify DNA as a genetic material in the molecular basis of information transfer.	L3
4. Analyze biological processes at the Genetic Engineering.	L4
5. Identify the potential of recombinant DNA technology.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC34T.1	2	2	-	-	-	2	-	-	-	-	-	2
20AC34T.2	2	2	-	-	-	2	-	-	-	-	-	2
20AC34T.3	3	3	-	-	-	3	-	-	-	-	-	3
20AC34T.4	3	3	-	-	-	3	-	-	-	-	-	3
20AC34T.5	2	2	-	-	-	2	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Microprocessor and Interfacing
Category ESC
Couse Code 20A445T

Year II B. Tech.
Semester II Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To understand the basic concepts of first general purpose16 bit Microprocessors and Advanced processors
- To learn the Programming and Interfacing Concepts of Microprocessors

Unit 1 8086 Architecture & Programming 14

Architecture of 8086 Microprocessor, Register organization, Memory organization, Machine language instruction formats of 8086. Addressing modes of 8086, Instruction set of 8086, Assembler directives, Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the features of first 16-bit microprocessor.
- Learn the programming concepts of 8086 microprocessor.

Unit 2 Modes of 8086 & DMA 13

Pin diagram of 8086 - Minimum mode and Maximum mode of operation, Timing diagrams. I/O Interfacing methods – I/O mapped I/O, Memory mapped I/O. Basic structure of SRAM and DRAM cell. Need for DMA, Architecture of 8257 and interfacing with 8086.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the operating modes of 8086.
- learn the working principle of DMA.

Unit 3 Programmable Peripheral Interface – 8255 & Programmable Interrupt Controller - 8259 12

Interfacing I/O ports – latches and buffers. 8255 PPI-Architecture, various modes of operation and interfacing to 8086. Seven segment Displays, Stepper motor, D/A, A/D converter interfacing.

8259: Data transfer Methods-Programmed I/O, interrupt driven I/O. Interrupt structure of 8086, Interrupt Vector Table, Interrupt service routines. 8259 PIC architecture and interfacing.

Learning Outcomes: At the end of the unit, the student will be able to :
- Interface I/O devices with 8086 using 8255.
- Interface programmable device 8259 with 8086.

Unit 4 Programmable Interval Timer/Counter (8253) & Communication Interface 12

Architecture of 8253 programmable interval timer/counter, modes of operation, interfacing with 8086.

Communication Interface: Asynchronous and synchronous data transfer schemes. Necessity of communication interfaces, 8251 USART architecture and interfacing, RS-232C. TTL to RS232C and RS232C to TTL conversion. Sample program of serial data transfer.

Learning Outcomes: At the end of the unit, the student will be able to:
- Interface programmable device 8253 with 8086.
- Understand features and programming concepts of USART.

Unit 5 Advanced Microprocessors **9**

Introduction to 80286.salient features of 80386, Real and protected mode, segmentation and paging, salient features of Pentium and Pentium pro processors.

Learning Outcomes: At the end of the unit, the student will be able to:

- Learn the features of advanced microprocessors
- Understand the concepts of segmentation & paging mechanisms.

Prescribed Text Books:

1. Advanced microprocessor and peripherals- A.K. Ray and K.M.Bhurchandi, 2nd edition, TMH,2000
2. Microprocessors and Interfacing- Douglas V.Hall, 2nd edition,2007

Reference Books:

1. The 8086 and 8088 Microprocessors- Walter A. Triebel, Avtar Singh, PHI, 4th Edition, 2003.
2. Micro computer system 8066/8088 family Architecture, programming and Design-By Liu and GA Gibson, PHI, 2nd Ed.
3. Intel 8086/8088 microprocessor architecture, programming, design and interfacing, Bhupendra Singh Chabra, Dhanpat Rai publications.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the Architectural features and programming concepts of 8086.	L2
2. Understand the operating modes of 8086.	L2
3. Interface I/O devices with 8086 through 8255.	L6
4. Interface different Programmable devices with 8086.	L6
5. Understand the features of advanced microprocessors.	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A445T.1	3	-	1	-	2	-	-	-	-	-	-	1	3	-	-
20A445T.2	3	2	2	1	2	-	-	-	-	2	-	1	3	-	-
20A445T.3	3	2	2	-	2	-	-	-	-	2	-	1	3	-	-
20A445T.4	3	2	2	2	2	-	-	-	-	2	-	1	3	-	-
20A445T.5	3	2	3	2	2	-	-	-	-	3	-	2	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Design and Analysis of Algorithms
Category PCC
Couse Code 20A541T

Year II B. Tech.
Semester II Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will

- Enhance to understand and analyze the performance of algorithms.
- Enable the students to study and apply algorithmic design techniques divide and conquer and greedy method.
- Make better understand the algorithmic design techniques in solving problems with dynamic programming method.
- Facilitate various algorithmic design techniques such as back tracking and branch and bound to solve problems.

Unit 1 Introduction **9**

Algorithm, Pseudo Code for algorithms, performance analysis-Space complexity, Time Complexity, Asymptotic Notation-Big Oh Notation, Omega Notation, Theta notation and Little Oh notation, Amortized complexity, Sets-Disjoint set operations, Union and Find algorithms.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand and analyze the performance of algorithms in terms of time and space complexity (L2, L4)
- Understand the set operations union and find algorithms (L2)

Unit 2 **11**

Divide and Conquer: General Method, applications- Binary Search, Quick sort, Merge Sort, Strassen's Matrix multiplication.

Greedy Method: General Method, applications-Job sequencing with dead-lines, knapsack problem, Minimum-cost Spanning trees, Single source shortest path.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply divide and conquer to solve searching and sorting problems (L4)
- Apply greedy method to solve the different types of optimization problems (L3)

Unit 3 Dynamic Programming **10**

General Method, applications- Matrix Chain multiplication, Optimal Binary search trees, 0/1 Knapsack, All pairs shortest path, The Travelling person problem, Reliability design.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze dynamic programming technique to solve different types of optimization problems like optimal binary search trees, knapsack, shortest path problems(L4)

Unit 4 **12**

Backtracking: General Method, applications- 8- queen problem, sum of subsets, graph coloring, Hamiltonian cycles.

Branch and Bound: General Method, applications-Travelling Sales Person (*), and 0/1 knapsack problem-LC Branch and Bound Solution, FIFO Branch and Bound solution.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and solve different types of backtracking applications (L2, L3)
- Apply branch and bound techniques to solve optimization problems (L3)

Unit 5 **6**

Basic Concepts, nondeterministic algorithms, the classes-NP-Hard and NP Complete, Cook's Theorem

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and remember the classes of NP-Hard and NP-Complete (L1, L2)
- Understand the Cook's theorem (L2)

Prescribed Text Books:

1. Ellis Horowitz, SartajSahni and Rajasekharam, Fundamentals of Computer Algorithms. Galgotia publications Pvt. Ltd.

Reference Books:

1. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Introduction to Design and analysis of Algorithms, A strategic approach. McGraw Hill.
2. Aho, Ullman and Hopcroft, Design and Analysis of algorithms. Pearson Education.
3. ParagHimanshu Dave, HimanshuBhalchandra Dave, Design and Analysis Algorithms. Pearson.
4. M.T. Goodrich and R.Tomassia, Algorithm Design: Foundations, Analysis and Internet Example. Johnwiley and sons.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand and analyze the performance of algorithms in terms of time and space complexity.	L2, L4
2. Apply divide and conquer to solve searching and sorting problems and greedy method to solve job sequencing with deadline.	L3
3. Analyze dynamic programming technique to solve knapsack, shortest path, travelling sales person problems.	L4
4. Understand and solve different applications of backtracking, and branch and bound techniques.	L2, L3
5. Understand and remember concepts of computational theory.	L1, L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A541T -1	3	3	-	-	-	-	-	-	-	-	-	3	3	3	3
20A541T-2	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A541T-3	3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20A541T-4	3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20A541T-5	3	3	-	-	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Foundations of Artificial Intelligence and Data Science
Category PCC
Couse Code 20A3041T

Year II B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To comprehend the building blocks of AI in terms of intelligent agents.
- To understand the main approaches of artificial intelligence such as heuristic search, game search and logical inference.
- Fundamental knowledge of concepts underlying data science and give a hands-on experience with real-world data analysis.
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
- Critically evaluate data visualizations based on their design and use for communicating stories from data

Unit 1 Introduction **9**

What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, structure of agents, Problem solving Agents, Problem Formulation, Uninformed Search Strategies.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands the basics of AI and Intelligent Systems (L2)
- Represents the problem formulation in real world environment (L3)

Unit 2 Informed Search methods **9**

Informed search methods – heuristic Functions, Hill Climbing, Simulated Annealing, A*, Performance Evaluation. Constrained Satisfaction Problems: Constraint Satisfaction Problems like – map Coloring, Crypt Arithmetic, and Backtracking for CSP, Local Search. Adversarial search techniques.

Learning Outcomes: At the end of the unit, the student will be able to:

- Solves a problem for solution using state space search (L5)
- Learns different search methods for problem solving (L1)

Unit 3 Introduction to Data Science **9**

What is Data Science: Big Data and Data Science hype – and getting past the hype, why now? – Deification, Current landscape of perspectives, Skill sets needed

Statistics for Data science: Populations and samples, Statistical modeling, probability distributions, fitting a model, Data Description, Probability, Distributions -Discrete and Continuous Distributions, Hypothesis testing, Regression Models – Linear and Multiple Regression models.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands the fundamental concepts of Data Science (L2)
- Apply the statistical methods for Data science problems (L3)

Unit 4 Data exploration and Data Learning algorithms **9**

Exploratory Data Analysis (EDA), Philosophy of EDA, tools for EDA, The Data Science Process, Feature Selection, Feature Generation and Extraction - Feature Selection algorithms – Filters; Wrappers.

Data Learning algorithms: Machine Learning Algorithms, Three Basic Algorithms - Linear Regression - k-Nearest Neighbors (k-NN) - k-means – SVM, Naïve Bayes, Logistic Regression.

Learning Outcomes: At the end of the unit, the student will be able to:

- Performs Exploratory Data Analysis for feature selection and decision making. (L5)
- Understands different Data Learning algorithms (L2)

Unit 5 Data visualization 9

Data visualization and presentation: Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects.

Applications of Data science in Business, Insurance, Energy, Health care, Biotechnology, Manufacturing, Utilities, Telecommunication, Travel, Governance, Gaming, Pharmaceuticals, Geospatial analytics and modeling

Learning Outcomes: At the end of the unit, the student will be able to:

- Design visual representations for processed data (L6)
- Apply data science methods in different application domains (L3)

Prescribed Text Books:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Edition, Pearson Publication.
2. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from the Frontline. O'Reilly Edition, 2014.

Reference Books:

1. Rich, E. and Knight, K., "Artificial Intelligence", Tata McGraw-Hill
2. George Lugar, "AI-Structures and Strategies for Complex Problem Solving", 4/e, 2002, Pearson Education
3. Robert J. Schalkolf, Artificial Intelligence: an Engineering approach, McGraw Hill, 1990
4. Patrick H. Winston, Artificial Intelligence, 3rd edition, Pearson
5. Jure Leskovek, Anand Rajaraman and Jerey Ullman. Mining of Massive Datasets. v2.1 Cambridge University Press. 2014
6. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the importance of artificial Intelligence in real world environment	L1, L2
2. Apply the artificial intelligence algorithms for problem solving	L3
3. Understand the key concepts, notations in data science and implement the standard methods of data analysis and decision making	L2, L3
4. Demonstrate the problem of knowledge extraction as combinations of data filtration, analysis and exploration methods	L3
5. Understand the importance of data visualization and the design and use of many visual components for effective communications and applications of data visualization in various domains.	L5, L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3041T-1	3	3	-	-	-	3		-	3	2	-	2	3	-	-
20A3041T-2	3	3	3	3	-	3	2	-	3	-	-	2	-	-	-
20A3041T-3	3	-	-	-	-	-	-	-	3	-	-	3	3	-	-
20A3041T-4	3	3	3	-	3	-	-	-	3	-	3	3	3	3	3
20A3041T-5	3	3	3	-	3	-	-	-	3	3	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Operating Systems
Category PCC
Couse Code 20A543T

Year II B. Tech.
Semester II Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To provide a grand tour of the operating system architecture and it's functions.
- To gain knowledge in process & thread synchronization, scheduling.
- To know the paging & memory management techniques.
- To understand memory, files, i/o and mass storage.
- To know about protection and security in operating systems.

Unit 1 **13**

Operating Systems Overview: Introduction, what operating systems do? Computer system Organization & architecture, Operating system operations.
Systems structures: Operating system services, systems calls, types of System calls.
Process Management: Process concepts; process Scheduling, operations on process, Process Scheduling Basic Concepts, Scheduling Criteria, scheduling algorithms, IPC, communication in Client-Server systems.
Learning Outcomes: At the end of the unit, the student will be able to

- Explain what is Operating system (L2)
- Illustrate Operating System Services. (L3)
- Demonstrate Process and CPU Scheduling Algorithms (L3)

Unit 2 **10**

Multithreaded Programming: Overview, Multithreading models, thread libraries, thread issues and thread scheduling, multiprocessor scheduling.
Concurrency: Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors.
Learning Outcomes: At the end of the unit, the student will be able to

- Explain multithreading implementation in Operating System(L2)
- Illustrate Concurrency and Synchronization among competitive Processes. (L3)

Unit 3 **12**

Principles of Deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.
Virtual Memory Management: Demand paging, page-replacement algorithms, Allocation of frames, Thrashing.
Learning Outcomes: At the end of the unit, the student will be able to

- Describe Deadlock Prevention, Avoidance and Recovery from Deadlocks. (L2)
- Demonstrate Implementation of Memory management in Operating System (L3)

Unit 4 **8**

File System Interface and Implementation: File Concept, Access Methods, Directory structure, File system mounting, allocation methods in Disk Space, free-space management.
Mass-storage Structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, RAID structure, stable-storage implementation.

Learning Outcomes: At the end of the unit, the student will be able to know:

- Explain File Access Methods and Directory Structure.(L2)
- Illustrate Disk Scheduling and RAID Structure.(L3)

Unit 5 **7**

I/O Systems: I/O Hardware, Transforming I/O requests to hardware operations.

Protection: Protection, Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights.

Security: The Security problem, program threats, system and network threats cryptography as a security tool, user authentication, firewalls to protect systems and networks, computer –security classifications.

Learning Outcomes: At the end of the unit, the student will be able to:

- Illustrate Know how Transforming I/O requests to hardware operations.(L3)
- Explain Different Issues in Protection and Security.(L2)

Prescribed Text Book:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 10th edition, John Wiley.

Reference Books:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition–2009, Pearson Education
2. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
3. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
4. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition
5. Operating Systems, A Concept based Approach-D.M.Dhamdhere, Second Edition, TMH.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand operating system functionalities, process concepts, scheduling criteria and scheduling algorithms.	L2
2. Apply the concepts of process synchronization in real computing problems.	L3
3. Analyze and investigate the local and global impacts of deadlocks and efficient utilization of memory Management techniques.	L4
4. Suggest appropriate file system and disk organizations for a variety of computing scenario.	L5
5. Evaluate security mechanisms in operating computing systems	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A543T.1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
20A543T.2	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
20A543T.3	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
20A543T.4	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
20A543T.5	3	3	2	2	1	-	-	1	-	-	-	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Probability and Statistics
Category BSC
Couse Code 20AC41T

Year II Year
Semester II Semester
Branch CE, ME, CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To describe the measures of central tendency.
- To introduce the basic concepts of probability theory.
- To elucidate probability distribution for solving problems in engineering.
- To introduce test of Hypothesis and confidence interval for a population parameter of large samples
- To explain the steps of testing of hypothesis for small samples

Unit 1 Introduction to Statistics **10**

Mean - Median and Mode for ungrouped and grouped data.
Correlation - correlation coefficient – Karl Pearson's coefficient - Spearman's rank correlation.
Learning Outcomes: At the end of the unit, the student will be able to:

- Summarize the basic concepts of data science and its importance in engineering (L2)
- Analyze the data quantitatively or categorically measure of averages variability (L4)
- Adopt Correlation methods and principle of least squares, regression analysis

Unit 2 Probability **10**

Axioms of probability – addition theorem of probability - conditional probability-multiplication theorem of probability (without proof) - Baye's theorem.
Random variables - discrete and continuous - Distribution functions - Mean and Variance.
Learning Outcomes: At the end of the unit, the student will be able to:

- Define the terms trail, events, sample space, probability and laws of probability (L1)
- Make use of probabilities of events in finite sample space from experiments (L3)
- Apply Baye's theorem to real time problems (L3)
- Explain the notation of random variable, distribution functions and expected value (L2)

Unit 3 Probability Distributions **8**

Binomial and Poisson distribution - fitting - normal distribution - their properties.
Learning Outcomes: At the end of the unit, the student will be able to:

- Apply binomial, passion distributions for real data to compute probabilities, theoretical frequencies (L3)
- Interpret the probabilities of normal distribution and its applications (L2)

Unit 4 Estimation and Testing of Hypothesis for Large Samples **10**

Point estimation - Interval estimation of one mean (small and large) - one Proportion (large).
Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).
Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the concepts of estimation, interval estimation and confidence intervals (L2)
- Apply the concepts hypothesis testing for large samples (L3)

Unit 5 Testing of hypothesis for small samples **10**

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

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply the concepts of testing hypothesis for small samples to draw the inferences (L3)
- Apply the concepts of estimation of the goodness of fit (L3)

Prescribed Textbooks:

1. Miller and Freund's, 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, a text book of Probability and Statistics, McGraw Hill, 2008.
4. T.K.V. Iyengar, B. Krishna Gandhi and others, Probability and Statistics, S. Chand, 2007.

Course Outcomes:

Upon successful completion of this course, the student will be able to	Blooms Level of Learning
1. Calculate and interpret the correlation between two variables.	L3
2. Understand the basic concepts of Probability, random variables and apply discrete and continuous probability distributions	L2
3. Employ the concepts of probability distributions in real life applications.	L3
4. Design the components of a classical hypothesis test for large samples	L4
5. Apply the knowledge of test of hypothesis for small samples in Engineering field.	L3

COs-POs-PSOs Mapping Table:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AC41T.1	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC42T.2	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC43T.3	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-
20AC44T.4	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
20AC45T.5	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Microprocessors and Interfacing Lab
Category ESC (LAB)
Couse Code 20A445L

Year II B. Tech
Semester II Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practical	Credits
0	0	3	1.5

Course Objectives:

- To learn Assembly Language programming.
- To understand programmable peripheral devices and their Interfacing.

List of the Experiments

Experiment No. 1 :- Arithmetic operations.
Experiment No. 2 :- Signed Arithmetic operations.
Experiment No. 3 :- ASCII – Arithmetic operations.
Experiment No. 4 :- Addition of two BCD numbers (4- digits each).
Experiment No. 5 :- Logical Operations
a. Code conversion.
b. Identify the parity (even/Odd) of a given byte/word.
Experiment No. 6 :- String Operations
a. Relocate a string of N words/bytes.
b. Reverse String.
c. Length of the String
d. String Insertion
e. String Deletion
f. Scanning a byte/ word.
Experiment No. 7:-LED/Seven Segment Display Interfacing
Experiment No. 8:- DAC Interfacing.
Experiment No. 9:- Stepper Motor Interfacing.
Experiment No. 10- 8251 Interfacing.

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Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Able to write Assembly Language programs.	L6
2. Able to understand programmable peripheral devices and their Interfacing	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A445L.1	3	-	-	-	2	2	-	-	1	-	-	-	3	-	-
20A445L.2	3	-	-	-	-	-	-	-	-	-	-	1	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Artificial Intelligence and Data Science Lab
Category PCC
Course Code 20A3041L

Year II B. Tech.
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Analyze different artificial intelligence techniques
- Implement the main approaches of artificial intelligence such as heuristic search, Constraint satisfaction problems
- Analyze different Data Science techniques
- Implement the main approaches of Data manipulation and exploratory data analysis.
- Implement machine learning algorithms for Data analysis

List of Programs

Exercise 1: Write a python program to implement Water jug problem,
Learning Outcomes: At the end of the module, the student will be able to:

- Apply and implement the basics of AI (L2)

Exercise 2: Write a python program to implement A* search.
Learning Outcomes: At the end of the module, the student will be able to:

- Solves a problem for solution using state space search (L5)

Exercise 3: Write a python program to implement Crypt arithmetic using Constraint satisfaction problem.
Learning Outcomes: At the end of the module, the student will be able to:

- Solves a problem for solution using state space search (L5)

Exercise 4: Write a python program to implement Hill climbing Search.
Learning Outcomes: At the end of the module, the student will be able to:

- Solves a problem for solution using state space search (L5)

Exercise 5: Write a python program to implement 8-Puzzle problem
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze and implements AI concept of 8-puzzle problem (L$, L6)

Exercise 6: Write python programs for Creation and manipulation of tuples, Creation and manipulation sets, Creation and manipulation list, Creating a list from another list - list comprehension, Generating an iterator and a generator
Learning Outcomes: At the end of the module, the student will be able to

- Understands the fundamental concepts of Data Science (L2)

Exercise 7: Write python programs for Creating Using the map function, Working with filters, Using zip and izip, Processing arrays from the tabular data, Sorting lists
Learning Outcomes: At the end of the module, the student will be able to

- Apply the statistical methods for Data science problems (L3)

Exercise 8: Write python programs for Grouping the data and using dot plots, Performing summary statistics and plots.
Learning Outcomes: At the end of the module, the student will be able to
- Design visual representations for processed data (L6)

Exercise 9: Write python programs for Imputing the data, performing random sampling, scaling the data, Calculating term frequencies and inverse document frequencies.
Learning Outcomes: At the end of the module, the student will be able to
- Performs Exploratory Data Analysis(L5)

Exercise 10: Write a python program for implementing feature selection algorithm?
Learning Outcomes: At the end of the module, the student will be able to
- Implement and analyze feature selection algorithms (L4, L6)

Exercise 11: Write python programs for Implement a classification model using logistic regression and k-NN algorithms. Find out the accuracy of classification Model.
Learning Outcomes: At the end of the module, the student will be able to
- Implement and interpret Data learning algorithms (L5, L6)

Exercise 12: Write python programs for Implement a classification model using logistic regression and Support Vector Machine (SVM) algorithms. Find out the accuracy of classification Model
Learning Outcomes: At the end of the module, the student will be able to
- Implement and interpret Data learning algorithms (L5, L6)

Exercise 13: Write python programs for Implement a k-nearest neighbor algorithm. Find out the accuracy of classification Model
Learning Outcomes: At the end of the module, the student will be able to
- Implement and interpret Data learning algorithms (L5, L6)

Exercise 14: Write python programs for Implement a Naïve Bayes algorithm. Find out the accuracy of classification Model
Learning Outcomes: At the end of the module, the student will be able to
- Implement and interpret Data learning algorithms (L5, L6**)**

Prescribed Text Books:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 2nd Edition, Pearson Publication.
2. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from the Frontline. O'Reilly Edition, 2014.

Reference Books:

1. Rich, E. and Knight, K., "Artificial Intelligence", Tata McGraw-Hill
2. George Lugar, "AI-Structures and Strategies for Complex Problem Solving", 4/e, 2002, Pearson Education
3. Robert J. Schalkolf, Artificial Intelligence: an Engineering approach, McGraw Hill, 1990
4. Patrick H. Winston, Artificial Intelligence, 3rd edition, Pearson
5. Jure Leskovek, Anand Rajaraman and Jerey Ullman. Mining of Massive Datasets. v2.1 Cambridge University Press. 2014
6. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Analyze artificial intelligence techniques	L4
2. Solve problems using different heuristic search techniques	L5
3. Applying the basic syntax used for data manipulation in Python	L3
4. Apply different methods for Exploratory Data Analysis	L3
5. Analyze and compare different classification techniques e.g. K-nearest neighbor, Regression, SVM etc.	L4, L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3041L.1	3	3	-	-	-	3	-	-	3	2	-	2	3	-	-
20A3041L.2	3	3	3	3	-	3	2	-	3	-	-	2	-	-	-
20A3041L.3	3	-	-	-	-	-	-	-	3	-	-	3	3	-	-
20A3041L.4	3	3	3	-	3	-	-	-	3	-	3	3	3	3	3
20A3041L.5	3	3	3	-	3	-	-	-	3	3	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Design and Analysis of Algorithms and Operating Systems Lab
Category PCC
Course Code 20A3042L

Year II B. Tech.
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- Understand, Apply, and analyze the performance of algorithm techniques divide and conquer, greedy, dynamic programming.
- Understand, apply, and analyze the performance of backtracking and branch and bound to solve various problems
- Process scheduling and synchronization
- Detection and Avoidance of deadlocks.
- Paging techniques and its replacement algorithms, file management techniques

List of Programs

Exercise 1: Sort a given set of elements using the Quicksort, merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.
Learning Outcomes: At the end of the module, the student will be able to:

- Apply divide and conquer to solve searching and sorting problems (L4)

Exercise 2: Find Minimum Cost Spanning Tree of a given undirected graph Prim's and Kruskal's algorithm.
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze dynamic programming technique to solve spanning tree problem L(4)

Exercise 3: Implement the knapsack problem by Greedy algorithm.
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze and implements Greedy programming technique to solve knapsack (L4, L5)

Exercise 4: Implement the 0/1 knapsack problem by Dynamic programming algorithm.
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze and implements dynamic programming technique to solve 0/1 knapsack problem (L4, L5)

Exercise 5: Find optimal ordering of matrix multiplication using Dynamic programming method.
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze dynamic programming technique to solve optimization problems (L4)

Exercise 6: Implement dynamic programming algorithm to solve all pairs shortest path problem.
Learning Outcomes: At the end of the module, the student will be able to

- Analyze dynamic programming technique to solve shortest path problem (L4, L5)

Exercise 7: Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
Learning Outcomes: At the end of the module, the student will be able to

- Analyze and implement back tracking technique to solve n-queens problems (L4, L5)

Exercise 8: Simulate the following CPU scheduling algorithms.
a) FCFS b) SJF c) Round Robin d) Priority
Learning Outcomes: At the end of the module, the student will be able to
- Demonstrate Process and CPU Scheduling Algorithms.(L3)

Exercise 9: Simulate synchronization of producer-consumer problem.
Learning Outcomes: At the end of the module, the student will be able to
- Demonstrate Process synchronization and IPC (L3)

Exercise 10: Simulate process synchronization using
a) Binary semaphore. b) Counting semaphore c) Dining philosopher's problem using monitor
Learning Outcomes: At the end of the module, the student will be able to
- Implement and analyze Process synchronization and IPC (L4, L6)

Exercise 11: Simulate a) Bankers Algorithm for Dead Lock Avoidance b) Dead Lock Detection.
Learning Outcomes: At the end of the module, the student will be able to
- Implement and interpret Deadlocks (L5, L6)

Exercise 12: Simulate the following page replacement algorithms
a) FIFO b) LRU c) LFU d) optimal
Learning Outcomes: At the end of the module, the student will be able to
- Demonstrate and implements page replacement algorithms (L3, L6)

Exercise 13: Simulate file Allocation strategies:
a) Sequential b) indexed c) linked
Learning Outcomes: At the end of the module, the student will be able to
- Demonstrate and implements file allocation strategy algorithms (L3, L6)

Exercise 14: Simulate the following File Organization Techniques
a) Single level directory b) Two level c) Hierarchical
Learning Outcomes: At the end of the module, the student will be able to
- Demonstrate and implements file organization strategies (L3, L6)

Prescribed Text Books:

1. Richard F.Gilberg, BehrouzA.Forouzan, Thomson, "Data Structures, A Pseudocode Approach with C++", 1st ed.,Business Information Press, 2007.
2. Thomas W. Doeppner, Operating Systems In Depth: Design and Programming, John Wiley & Sons

Reference Books:

1. Thomas W. Doeppner, Operating Systems In Depth: Design and Programming, John Wiley & Sons.
2. Dan Parks Sydow, Programming the Be Operating System: Writing Programs for the Be Operating System, O'Reilly.
3. Ellis Horowitz, SatrajSahni and Rajasekharam, "Fundamentals of Computer Algorithms", 2nd ed., Galgotia publications pvt. Ltd, 2006.
4. D.S.Malik, Thomson, "Data Structures Using C++", 1st ed., Cengage Learning, 2007.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand, Apply and Analyze the implementation of divide and conquer, greedy and dynamic programming techniques	L2, L3, L4, L5
2. Understand, Apply and Analyze the implementation of back tracking and branch and bound techniques	L2, L3, L4, L5
3. Analyze the process scheduling and synchronization	L4
4. Discover and solve the detection and avoidance of deadlocks	L3
5. Analyze and Evaluate the Paging technique, page replacement algorithms and file management technique	L4, L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3042L.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3042L.2	3	3	3	3	-	3	2	-	-	-	-	3	3	3	3
20A3042L.3	3	3	-	-	-	-	-	-	-	-	-	3	3	3	3
20A3042L.4	3	3	1	1		-	-	-	-	-	-	3	3	3	3
20A3042L.5	3	3	1	1		-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Web Programming
Category SC-Skill Oriented Course
Couse Code 20A3043L

Year II B. Tech.
Semester II Semester
Branch AI & DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will make the students
- Interpret and use HTML concepts in developing the web pages
- Use the tables and forms controls to design web pages.
- Use the CSS to design web pages.
- Interpret the JavaScript programming language
- Use the ES6 to validate web pages

Module 1 **Theory Hours: 05, Practice sessions:08**

Structuring Documents for the Web-A Web of Structured Documents, Introducing HTML5, Tags and Elements, Attribute Groups Core Attributes, Internationalization, Core Elements, Basic Text Formatting, Understanding Block and Inline Elements, Grouping Content, Text Processing tags, Links and Navigation: Basic Links, Understanding Directories and Directory Structures, Understanding URLs, Creating In-Page Links with the <a> Element.

Learning Outcomes: At the end of the unit, the student will be able to
- Understand the basic html tags for creating the web pages(L2)
- Use the anchor tag in web page environment(L3)

Module 2 **Theory Hours: 05, Practice sessions: 06**

Tables: Introducing Tables, Basic Table Elements and Attributes, adding a Caption to a Table, Grouping Sections of a Table, Nested Tables, Accessible Tables. Forms: Introducing Forms, creating a Form with the <form> Element, Form Controls, Creating Labels for Controls and the <label> Element, Structuring Your Forms with <fieldset> and <legend> Elements, Focus, Disabled and Read-Only Controls, Sending Form Data to the Server, Creating More Usable Form Fields.

Learning Outcomes: At the end of the unit, the student will be able to:
- Apply table tags in web page development environment (L3).
- Use forms controls in developing the web pages (L3).

Module 3 **Theory Hours: 04, Practice sessions: 08**

Cascading Style Sheets: Introducing CSS, Where You Can Add CSS Rules, CSS Properties Controlling Text, Text Formatting, Text Pseudo-Classes, Styling Text, Selectors Lengths, Introducing the Box Model, An Example Illustrating the Box Model, Links, Backgrounds, Lists, Tables, And Miscellaneous Properties.

Learning Outcomes: At the end of the unit, the student will be able to:
- Apply various CSS properties in creation of web pages(L3)
- Implement the various CSS selectors in web based applications(L3)

Module 4 **Theory Hours: 05, Practice sessions: 06**

Learning JavaScript-Introduction to JavaScript, How to Add a Script to Your Pages, comments in JavaScript, Create an External JavaScript, The Document Object Model, JavaScript Programming console, General Programming Concepts, Variables, Operators, String Operators (Using + with Strings), Functions, Conditional Statements, Looping, Events, Built-in Objects.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the basic JavaScript concepts in creation of their web pages(L2)
- Use different types of JavaScript operators, functions and Objects in web page development(L3)

Module 5 **Theory Hours: 05, Practice sessions: 06**

Introduction to ES6, syntax: Block scoped declarations, spread/rest, Default parameter values, Destructing, Object literal extensions, Template literals, Arrow functions, for, of loops, Regular expressions, Number literal extensions, symbols. Organization: Iterators, Generators, Modules, classes

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic concepts of ES6 in creation of their web pages (L2).
- Use different types of ES6 iterators, generators and modules in web pages(L3)

Prescribed Text Books:

1. Beginning HTML and CSS Rob Larsen, Wrox Programmer to Programmer.
2. ES6 & Beyond: You don't know JS, Kyle Simpson, Orielly Publications

Reference Books:

1. JavaScript and JQuery: Interactive Front-End Web Development, Jon Duckett, Wiley Publications
2. Web Design with HTML, CSS, JavaScript and jQuery Set, Jon Duckett, Wiley Publications
3. jQuery in Action, Bear Bibeault, Yehuda Katz, and Aurelio De Rosa, Third Edition, Manning Publications
4. https://www.w3schools.com/

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Interpret and apply the fundamental HTML markups when designing web pages.	L2, L3
2. Apply and design the web pages with Tables and forms controls.	L3, L6
3. Implement cascading style sheets to design web pages	L3, L6
4. Interpret and use JavaScript concepts in designing web pages	L3, L6
5. Apply ES6 to validate the web pages.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3043L.1	-	3	3	3	3	2	3	-	3	2	2	3	3	3	3
20A3043L.2	-	3	3	3	3	2	3	-	3	2	2	3	3	3	3
20A3043L.3	-	3	3	3	3	2	3	-	3	2	2	3	3	3	3
20A3043L.4	-	3	3	3	3	2	3	-	3	2	2	3	3	3	3
20A3043L.5	-	3	3	3	3	2	3	-	3	2	2	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Data Warehousing and Data Mining
Category PCC
Couse Code 20A3051T

Year III B. Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To learn the types of the data to be mined and apply preprocessing methods on raw data.
- To design data warehouses and techniques for mining frequent patterns, associations, and correlations.
- To understand different classification algorithms and estimate the accuracy of algorithms.
- To inculcate knowledge on different clustering algorithms.
- To identify the various types of complex data and its applications.

Unit 1 **10**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Major issues in Data Mining.
Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
Learning Outcomes: At the end of the unit, the student will be able to
- Understand data mining and its functionalities. (L2)
- Understand and apply the data preprocessing techniques. (L2, L3)

Unit 2 **10**

Data Warehousing: Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, From Data Warehousing to Data Mining.
Mining Association Rules in Large Databases: Basic Concepts and a Road Map, Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis.
Learning Outcomes: At the end of the unit, the student will be able to:
- Design data warehouses (L6)
- Apply different techniques for mining frequent patterns, associations, and correlations. (L3)

Unit 3 **9**

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Support Vector Machines, Other Classification Methods, Prediction, Classifier Accuracy.
Learning Outcomes: At the end of the unit, the student will be able to:
- Solve different classification problems. (L5)
- Estimate the accuracy of classification algorithms. (L5)

Unit 4 **10**

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand and analyze different clustering techniques. (L2, L4)
- Apply different clustering techniques on real time data. (L3)

Unit 5 **8**

Mining Complex Types of Data and Data Mining Applications: Mining Spatial Databases, Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web, Data Mining Applications.

Learning Outcomes: At the end of the unit, the student will be able to:

- Create various types of complex data such as spatial, text and multimedia. (L2)
- Analyze and apply techniques on complex data types (L3, L4)

Prescribed Text Books:

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

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, PaulrajPonnaiah Wiley Student Edition.
5. The Data Warehouse Life cycle Tool kit, Ralph Kimball Wiley Student Edition.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. To understand and apply the data preprocessing techniques.	L2, L3
2. To design data warehouses and techniques for mining frequent patterns, associations, and correlations.	L2, L6
3. To solve different classification problems and estimate the accuracy of classification algorithms.	L3
4. To understand and analyze different clustering techniques.	L2, L3
5. To create various types of complex data such as spatial, text and multimedia.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3051T.1	3	3	3	-	3	-	-	-	-	-	3	-	-	3	3
20A3051T.2	3	3	3	3	3	3	-	-	2	3	-	-	3	3	-
20A3051T.3	3	3	3	3	3	-	-	-	-	-	-	-	-	2	2
20A3051T.4	3	3	-	-	3	-	-	-	-	-	-	-	2	-	3
20A3051T.5	3	3	3	3	2	2	-	-	-	-	-	2	-	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Computer Networks
Category PCC
Couse Code 20A552T

Year III B. Tech.
Semester I Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.
- To understand the working of various Application Layer Protocols.

Unit 1 Introduction and Physical Layer 9

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.
Learning Outcomes: At the end of the unit, the student will be able to:
- Discuss the network models and protocol stack. (L2)
- Differentiate transmission media and addressing mechanisms. (L2)

Unit 2 Data Link Layer 9

Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols.
Learning Outcomes: At the end of the unit, the student will be able to:
- Classify error detection and correction techniques. (L2)
- Explain random access and controlled access protocols. (L2)

Unit 3 Network Layer 9

Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.
Learning Outcomes: At the end of the unit, the student will be able to:
- Describe the design issues and routing algorithms in the network layer. (L2)
- Discuss the various congestion control mechanisms (L2)

Unit 4 Transport Layer 9

Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.
Learning Outcomes: At the end of the unit, the student will be able to:
- Summarize various transport services available in the transport layer. (L2)
- Differentiate between TCP and UDP protocols. (L2)

Unit 5 Application Layer **9**

Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the concepts of DNS. (L2)
- Explain about electronic mail protocols. (L2)

Prescribed Text Books:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson New International Edition, 2016.
2. Behrouz A. Forouzan, Data Communication and Networking, 4th Edition, McGraw- Hill, 2017.

Reference Books:

1. William Stallings, Data and Computer Communication, 8th Edition, Pearson, PHI, 2013.
2. Douglas Comer, Internetworking with TCP/IP, 6th Edition, PHI, 2015.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Classify the different aspects of networks, protocols and network design models.	L2
2. Examine various Data Link layer design issues and Data Link protocols.	L4
3. Analyze, Compare and select appropriate routing algorithms for a network	L2, L4, L5
4. Examine the various end to end protocols helps in analyzing and interpreting the quality of networks.	L4
5. Identify and analyze the various application protocols over internet	L3, L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A552T.1	3	2	-	3	-	-	-	-	-	-	-	-	3	-	2
20A552T.2	2	3	3	3	-	-	-	-	3	-	-	-	3	-	1
20A552T.3	3	3	3	3	3	-	-	-	-	-	-	-	3	-	1
20A552T.4	2	3	3	3	3	-	-	-	1	2	-	-	3	-	1
20A552T.5	3	-	-	3	3	-	-	-	3	2	1	2	3	1	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Software Engineering
Category PCC
Couse Code 20A553T

Year III B. Tech.
Semester I Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This Course will

- Define software life cycle, and various process models.
- Describe the Requirements and their importance
- Understand the needs of Designs at different levels
- Demonstrate various testing strategies and interfaces
- Analyzing the development and maintenance of a project.

Unit 1 **9**

Software and Software Engineering: The Nature of Software, Software Engineering, Software Process, Software Engineering Practice, Software Myths.
Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models.
Learning Outcomes: At the end of the unit, the student will be able to

- Remember the basic concepts of Software Engineering (L1)
- Recognize the different types of process models (L2)

Unit 2 **9**

Understanding Requirements: Requirements Engineering, Software Requirement Specification, Eliciting requirements, Developing Use Cases, Negotiating Requirements, and Validating Requirements.
Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, CRC.
Learning Outcomes: At the end of the unit, the student will be able to:

- Define the software requirements (L1)
- Identify various requirements models (L2)

Unit 3 **9**

Design Concepts: Design within the Context of Software Engineering, Design Process, Design Concepts.
Architectural Design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.
Component-Level Design: What is a Component, Designing Class-Based Components, and Conducting Component-Level Design.
Learning Outcomes: At the end of the unit, the student will be able to:

- Identify importance of design (L2)
- Apply various design criteria's (L3)

Unit 4 **9**

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Design Steps.
Testing: Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing
Learning Outcomes: At the end of the unit, the student will be able to:

- Demonstrate the user interface concepts (L3)
- Recognize various testing strategies (L2)

Unit 5 **9**

Software Project Management: Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Staffing Level Estimation, Organization and Team Structures, Risk Management, Software Configuration Management Software Reliability and Quality Management: Software reliability, Software Quality, Software Quality Management System, SEI Capability Maturity model levels.

Software Maintenance: Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models and Estimation of Maintenance cost.

Learning Outcomes: At the end of the unit, the student will be able to:

- Examine the software project management (L4)
- Interpret the software projects (L3).

Prescribed Text Books:

1. Software Engineering A Practitioner's Approach, Roger S. Pressman, Seventh Edition, 2009, Mc Graw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Fourth Edition, 2014, PH

Reference Books:

1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Remember software process models importance.	L1, L3
2. Describe the Knowledge on software requirements.	L3, L4
3. Understand the software architecture with various design approaches.	L3, L4
4. Demonstrate the various testing strategies	L5
5. Analyze the maintenance of a software project	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A553T.1	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
20A553T.2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
20A553T.3	-	-	3	-	2	-	-	-	-	-	-	-	2	-	-
20A553T.4	3	-	-	-	2	-	-	-	-	-	-	-	-	-	2
20A553T.5	3	-	-	-	-	-	-	-	3	-	3	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Advanced Artificial Intelligence
Category PEC
Couse Code 20A305BT

Year III B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To learn the significance of knowledge representation and predict the future using probability-based approaches.
- To understand how intelligent agents can make decision in real-time environments.
- Examine how an agent can learn from success and failure from real world environment.
- Understands the concepts of parallel and distributed AI
- Formalize and design solutions to practical problems of current interest using the strategies

Unit 1 **9**

Knowledge Representation: Ontological engineering, Situation Calculus, semantic networks, description logic
Probabilistic Reasoning over time: Hidden Markov Models, Kalman Filters
Learning Outcomes: At the end of the unit, the student will be able to:
- Learn how to use first-order logic to represent important aspect of the real world. (L1)
- Interpret the present, understand the past and predict the future using hidden Markov models. (L2)

Unit 2 **9**

Making decisions: Utility theory, utility functions, decision networks, sequential decision problems, Partially Observable MDPs, Game Theory
Learning: Learning from observations, Forms of Learning, Inductive Learning, Learning decision trees, ensemble learning, why learning works.
Learning Outcomes: At the end of the unit, the student will be able to:
- Understands how an agent should make decisions (L2)
- Describes agents that can improve their behavior through their experience (L2)

Unit 3 **9**

Statistical learning methods, learning with complete data, learning with hidden variables, instance-based learning. Neural networks, kernel machines.
Reinforcement learning: Passive and Active Reinforcement learning, generalization in RL policy search.
Learning Outcomes: At the end of the unit, the student will be able to:
- Learning as form of uncertain reasoning from observations. (L1)
- Examine how an agent can learn from success and failure from real world environment. (L5)

Unit 4 **9**

Planning: Planning with state space search, Partial-Order Planning, Planning Graphs, Planning with Propositional Logic, hierarchical task network planning, non-deterministic domains, conditional planning, continuous planning, multi-agent planning.
Natural Language Processing: Syntactic Processing, Semantic Analysis, Discourse and Pragmatic processing, Statistical Natural Language Processing.

Learning Outcomes: At the end of the unit, the student will be able to:
- Learns how an agent can take advantage of structure of a problem to construct complex actions(L1)
- Understands how the NLP will process language (L2)

Unit 5 **9**

Parallel and distributed AI: Psychological Modelling, Parallelism in Reasoning system. Distributed Reasoning System.

Expert System: Expert System shelfs, Explanations, Knowledge Acquisition

Perception and Action: Real-time search, Perception, Action, Robot architecture.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands the concepts of parallel and distributed AI (L2)
- Apply AI concepts on expert systems and robots. (L3)

Prescribed Text Books:

1. Stuart Russell, Peter Norvig " Artificial Intelligence-A modern approach", 2nd edition, Pearson LPE
2. Elaine Rich, Kevin Knight and Shivashankar B Nair" Artificial Intelligence", 3rd edition, TMH, 2010 [Unit 4,5]

Reference Books:

1. George Lugar, "AI-Structures and Strategies for Complex Problem Solving", 4/e, 2002, Pearson Education.
2. Robert J. Schalkolf, Artificial Intelligence: an Engineering approach, McGraw Hill, 1990.
3. Patrick H. Winston, Artificial Intelligence, 3rd edition, Pearson.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Interpret the present, understand the past and predict the future using hidden Markov models.	L2, L4
2. Describes agents that can improve their behavior through their experience	L2
3. Examine how an agent can learn from real world environment and observations.	L5
4. Learns how an agent can take advantage of structure of a problem to construct complex actions	L1
5. Understand and apply the AI concepts on intelligent systems for complex actions	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305BT.1	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A305BT.2	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A305BT.3	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A305BT.4	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A305BT.5	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Optimization Techniques
Category PEC
Couse Code 20A305CT

Year III B. Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
The student will be able to learn:

- The basic concepts of Optimization Techniques.
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- Optimality of balanced transportation Problems.
- Constrained and unconstrained nonlinear programming.
- Principle of optimality and dynamic programming.

Unit 1 Introduction and Classical Optimization Techniques: 12

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes: At the end of unit, students will be able to

- Know about classification of single and multivariable optimization problems with or without constraints (L2)
- Understand how to formulate Kuhn-Tucker conditions and to solve numerical problems. (L2)

Unit 2 Linear Programming 10

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes: At the end of unit, students will be able to

- Understand about formulation of LPP (L2)
- Understand about necessity of Simplex method and to solve numerical problems (L5)

Unit 3 Nonlinear Programming – One Dimensional Minimization methods 9

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

Learning Outcomes: At the end of unit, students will be able to

- Know about NLP in one dimensional optimization problems. (L2)
- Analyze various search methods and interpolation methods. (L4)

Unit 4 Unconstrained & Constrained Nonlinear Programming 9

Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method

Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes: At the end of unit, students will be able to

- Distinguish between unconstrained and constrained optimization problems (L4)
- Learn about direct search methods in unconstrained and constrained NLP problems and comparison (L2)

Unit 5 Dynamic Programming 9

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution – Numerical examples.

Learning Outcomes: At the end of unit, students will be able to understand the following:

- Know about DP problem and computational procedure in solving DPP. (L2)
- Apply Calculus and Tabular methods of solving with numerical examples of various methods. (L5)

Prescribed Text Books:

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

Reference Books:

1. R Fletcher, "Practical Methods of Optimization" , 2nd Edition, Wiley Publishers, 2000.
2. K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3rd Edition, New Age International (P) Limited, 1996.
3. S.D. Sharma, "Operations Research", Kedar Nath, 2012.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand basic methods, principles in optimization.	L2
2. Formulation of optimization models, solution methods in optimization.	L5
3. Understands the concept of basic feasible solutions.	L2
4. Apply methods of linear and non-linear (constrained and unconstrained) programming to solve optimization problems.	L3
5. Solve the applications of engineering problems.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305CT-1	3	3	3	3	3	3	-	-	-	-	-	3	3	3	3
20A305CT-2	3	3	3	3	3	3	-	-	-	-	-	3	3	3	3
20A305CT-3	3	3	3	3	3	3	-	-	-	-	-	3	3	3	3
20A305CT-4	3	3	3	3	3	3	-	-	-	-	-	3	3	3	3
20A305CT-5	3	3	3	3	3	3	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Data Visualization Techniques
Category PEC
Couse Code 20A305DT

Year III B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To develop skills to both design and critique visualizations
- To introduce visual perception and core skills for visual analysis.
- To understand visualization for time-series analysis and ranking analysis.
- To understand visualization for deviation analysis and distribution analysis, correlation analysis and multivariate analysis.
- To analyze visualized dash boards.

Unit 1 Core Skills for Visual Analysis 9

Information Visualization – Effective Data Analysis – Traits of Meaningful Data – Visual Perception –Making Abstract Data Visible – Building Blocks of Information Visualization – Analytical Interaction – Analytical Navigation – Optimal Quantitative Scales – Reference Lines And Regions – Trellises And Crosstabs – Multiple Concurrent Views – Focus And Context – Details On Demand – Over-Plotting Reduction – Analytical Patterns – Pattern Examples.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands the basics of visualization (L2)
- Understands and Design visual pattern representations (L2, L6)

Unit 2 Time-Series, Ranking and Deviation Analysis 9

Time-Series Analysis – Time-Series Patterns – Time-Series Displays – Time-Series Best Practices – Part-To-Whole and Ranking Patterns – Part-To-Whole and Ranking Displays – Best Practices – Deviation Analysis – Deviation Analysis Displays – Deviation Analysis Best Practices.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands Time Series patterns and Apply visual analytics on Time Series analysis. (L2, L3)
- Performs deviation analysis and ranking. (L3)

Unit 3 Distribution, Correlation and Multivariate Analysis 9

Distribution Analysis – Describing Distributions – Distribution Patterns – Distribution Displays – Distribution Analysis Best Practices – Correlation Analysis – Describing Correlations – Correlation Patterns – Correlation Displays – Correlation Analysis Techniques and Best Practices – Multivariate Analysis – Multivariate Patterns – Multivariate Displays – Multivariate Analysis Techniques And Best Practices

Learning Outcomes: At the end of the unit, the student will be able to:

- Performs distributions and correlations for data analysis (L3).
- Design multivariate display on patterns (L6)

Unit 4 Information Dashboard Design 9

Information Dashboard – Introduction– Dashboard Design Issues and Assessment of Needs – Considerations for Designing Dashboard-Visual Perception – Achieving Eloquence

Learning Outcomes: At the end of the unit, the student will be able to:

- Learns dashboard design process (L2).
- Design visual perception on multi-informative data (L6)

Unit 5 **9**

Advantages Of Graphics - Library Of Graphs – Designing Bullet Graphs – Designing Sparklines – Dashboard Display Media –Critical Design Practices – Putting It All Together-Unveiling The Dashboard.

Learning Outcomes: At the end of the unit, the student will be able to:

- Learns the importance of data visualization techniques (L2)
- Design an informative dash board (L6)

Prescribed Text Books:

1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008
2. Edward R. Tufte, "The visual display of quantitative information", Second Edition, Graphics Press, 2001
3. Evan Stubbs, "The value of business analytics: Identifying the path to profitability", Wiley, 2011

Reference Books:

1. Gert H. N. Laursen and Jesper Thorlund, "Business Analytics for Managers: Taking business intelligence beyond reporting", Wiley, 2010
2. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013
3. Stephen Few, "Information dashboard design: Displaying data for at-aglance monitoring", second edition, Analytics Press, 2013
4. Stephen Few, "Now you see it: Simple Visualization techniques for quantitative analysis", Analytics Press, 2009

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain principles of visual perception	L2
2. Apply core skills for visual analysis	L3
3. Apply visualization techniques for various data analysis tasks	L3
4. Design information dashboard	L6
5. Analyze visualization for multivariate	L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305DT-1	3	3	3	-	-	-	-	-	-	3	-	-	3	3	3
20A305DT-2	3	3	3	-	-	-	-	-	-	-	-	-	3	3	3
20A305DT-3	3	3	3	-	-	-	-	-	-	3	-	-	3	3	3
20A305DT-4	3	3	3	-	-	-	-	-	-	3	-	-	3	3	3
20A305DT-5	3	3	3	-	-	-	-	-	-	3	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Scalable Algorithms for Data Analysis
Category PEC
Couse Code 20A305ET

Year III B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Familiarize how data affects the performance of analysis algorithms and their scalability
- Identify the role of attributes in parallelization of analytics algorithms.
- Explore the use of pre-trained models in data analytics
- Analyze the data parallelization and process of parallelization.
- Makes use of hashing and batch processing framework.

Unit 1 Introduction **9**

Data and Relations - Data scales, Set and Matrix representations, Relations, Similarity and dissimilarity measures, Sequence relations. Data preprocessing - Error types, error handling, filtering, transformation, merging. Data visualization.

Correlation - Linear, Causality, Chi-Square tests. Regression - Linear regression, Robust regression, RBF networks, Cross validation and feature selection.

Learning Outcomes: At the end of the unit, the student will be able to:

- Use of data processing and data visualization (L3)
- Understand the correlation and regression (L2)

Unit 2 Analytical Models **9**

Finite state machines, Recurrent models, Autoregressive models, Naive Bayes classifier, LDA, SVM, and Learning Vector Quantization.

Clustering: Cluster partitions, Sequential clustering, Prototype based clustering, Fuzzy clustering, Relational clustering, Cluster tendency assessment, **5** Cluster validity, Self-organizing map

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands various analytical models(L2)
- Make use of different types of clustering (L3)

Unit 3 **9**

ReLU nonlinearity, Data Augmentation, MLP Convolutional Layer, Global Average Pooling, Dimensionality Reduction, Cascading, CNN- based feature extraction.

Learning Outcomes: At the end of the unit, the student will be able to:

- Learns about data augmentation and dimensionality reduction (L3)
- Describes the CNN-based feature extraction. (L2)

Unit 4 Scalability through parallelization **9**

Data parallelization, Process parallelization, Scaling using feature engineering, Feature reduction through spatial transforms.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze the benefits of parallel processing (L4)
- Learns how to use spatial transforms (L3)

Unit 5 **9**

Use of hashing, Multiple feature hashing, Multimodal fusion for classification, Batch processing frameworks.
Case Studies: AlexNet, VGG, GoogLeNet, ResNet.
Learning Outcomes: At the end of the unit, the student will be able to:

- Apply hashing and batch processing framework (L3)
- Make use of AlexNet, VGG, GoogLeNet, ResNet (L3)

Prescribed Text Books:

1. Thomas A. Runkler, "Data Analytics - Models and Algorithms for Intelligent Data Analysis", Springer 2012

Reference Books:

1. Stefanos Vrochidis, Benoit Huet, Edward Chang, Ioannis Kompatsiaris, "Big Data Analysis for Large-Scale Multimedia Search", Wiley 2019
2. J. O. Moreira, Andre Carvalho, Tomas Horvath, "A General Introduction to Data Analytics", Wiley 2019

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Identify data errors and dependencies among attributes by modelling them as sets & relations	L2
2. Apply regression, classification, and clustering models on a given dataset	L3
3. Analyze data and processes for opportunities on parallelization	L4
4. Apply data on pertained networks and perform classification	L3
5. Illustrate the use of hashing and batching processing	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A305ET.1	3	3	3	-	-	-	-	-	-	-	-	-	3	3	3
20A305ET.2	3	3	3	1	-	-	-	-	-	-	-	-	3	3	3
20A305ET.3	3	-	-	-	-	-	-	-	-	-	-	-	3	3	3
20A305ET.4	3	-	-	-	-	-	-	-	-	-	-	-	3	3	3
20A305ET.5	3	3	3	-	2	-	-	-	-	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Data Mining and Software Engineering Lab
Category PCC(LAB)
Course Code 20A3051L

Year III B. Tech.
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:

- To apply different preprocessing techniques and find frequent item sets from the datasets.
- To perform classification and numeric prediction on different data sets.
- To discover clusters using different clustering algorithms.
- To define functional and non-functional requirements for SRS document.
- To Implement various design diagrams through appropriate tool and apply various testing strategies.

Data Mining Lab

List of Programs

Exercise-1: Demonstration on Basic Data Exploration using various interesting patterns.

A. Saving your work
B. Loading your own data set.

Learning Outcomes: At the end of the module, the student will be able to:

- Explore data in orange tool and visualize various interesting patterns. (L2, L3)

Exercise-2: Demonstration of preprocessing on Melbourne Housing Snapshot dataset.
Exercise-3: Find frequent item sets and association rule discovery by using association rule process.
Learning Outcomes: At the end of the module, the student will be able to:

- Apply and understand frequent itemset mining and rule discovery. (L2, L3)
- Use different preprocessing techniques in data mining (L3).

Exercise-4: Demonstration on decision tree induction by using scoring methods.

A. Information gain
B. Gain ratio

Exercise-5: How to make classifications for heart_disease dataset.

A. Naïve Bayes
B. Neural Networks
C. Support Vector Machines
D. Classification tree

Find which classification method is best by applying different strategies among above.

Learning Outcomes: At the end of the module, the student will be able to:

- Apply different feature and ranking methods. (L3).
- Apply and analyze different classification techniques on the data set. (L3, L4)

Exercise-6: how to make predictions using classification tree model to predict class label of a test sample.
Learning Outcomes: At the end of the module, the student will be able to:

- Understand the class label attribute of an unknown sample. (L2)

Exercise-7: Demonstration on evaluating regression to predict numerical value of a test sample.
Learning Outcomes: At the end of the module, the student will be able to:

- Understand the numeric prediction of an unknown sample. (L2)

Exercise-8: How to make k-means clustering with iris dataset.
Learning Outcomes: At the end of the module, the student will be able to:

- Understand and apply k-means clustering algorithm. (L2, L3)

Task Resources:

1. Download and install orange data mining tool from https://orangedatamining.com/download/#windows.
2. Orange data mining tool tutorials.

Software Engineering Lab

List of Programs

Exercise 1: a) Define a problem statement.
b) Preparation of Software Requirement Specification Document, Design Document.
Exercise 2: Define the functional and non-functional requirements of the system using use cases and prepare SRS document also.
Learning Outcomes: At the end of the module, the student will be able to:

- Understand the problem.
- Define software requirements

Exercise 3: a) Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated.
b) Design and document a use case diagram for a problem statement.
Exercise 4: Design a class diagram and object diagrams using Rational tools
Learning Outcomes: At the end of the module, the student will be able to:

- Analyze the risk
- Draw use cases for a given problem

Exercise 5: a) Write C/C++/Java/Python program for classifying the various types of cohesion and coupling.
b) Develop test cases for unit testing and integration testing
Exercise 6: Schedule all the activities and sub-activities Using the PERT/CPM charts
Learning Outcomes: At the end of the module, the student will be able to:

- Implementing programs for the given task.
- Apply test cases and document the results.

Exercise 7: Define an appropriate metrics for at least 3 quality attributes for any software application
Learning Outcomes: At the end of the module, the student will be able to:

- Draw different charts.
- Describing quality factors of a system.

Case Studies:
Case studies given below should be Modeled using Visual Modeling tools in different views i.e. Use case view, logical view, component view, Deployment view.
Case Study 1: A Point of Sale (PoS) System
Problem Statement: A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDA"s, touch – screens.

Case Study 2: Online Auction Sales

Problem Statement: The online auction system is a design about a website where sellers collect and prepare a list of items they want to sell and place it on the website for visualizing. To accomplish this purpose the user has to access the site. Incaseit‟s a new user he has to register. Purchaser‟s login and select items they want to buy and keep bidding for it. Interacting with the purchasers and sellers through messages does this. There is no need for customer to interact with the sellers because every time the purchasers bid, the details will be updated in the database. The purchaser making the highest bid for an item before the close of the auction is declared as the owner of the item. If the auctioneer or the purchaser doesn‟t want to bid for the product then there is fixed cutoff price mentioned for every product. He can pay that amount directly and own the product. The purchaser gets a confirmation of his purchase as an acknowledgement from the website. After the transition by going back to the main menu where he can view other items.

Case Study 3: Recruitment Procedure for Software Industry

Problem Statement: In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company. The technical skill and the experience of the candidates are reviewed and the short listed candidates are called for the interview. There may be different rounds for interview like the written test, technical interview, and HR interview. After the successful completion of all rounds of interview, the selected candidates‟ names are displayed. Meanwhile HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate.

Case Study 4: Online Ticket Reservation For Railways

Problem Statement: Computer play an integral part of the day in today‟s life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger‟s information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and the AC compartment. Design the application for the above problem description.

Prescribed Text Books:

1. SoftwareEngineeringAPractitioner'sApproach,RogerS.Pressman,SeventhEdition,2009,McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Fourth Edition, 2014,PH
3. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.

Reference Books:

1. Software Engineering, Ian Sommerville, Ninth edition, Pearsoneducation
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Software Engineering, A Precise Approach, PankajJalote, WileyIndia,2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford UniversityPress

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. To explore data using different orange tool widgets and apply preprocessing techniques.	L1, L2
2. To find the frequent item sets and construct decision trees	L1
3. To analyze the number of clusters using different clustering algorithms.	L4
4. List the requirements and risk factors in a system	L1
5. To apply UML diagrams to solve the problem and analyze different testing methodologies	L3, L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3051L.1	3	3	3	-	3	-	-	-	-	-	1	-	-	3	3
20A3051L.2	3	3	3	-	3	2	-	-	1	1	-	-	2	3	-
20A3051L.3	3	3	3	3	-	-	-	-	-	-	-	-	-	3	3
20A3051L.4	-	3	2	-	3	-	-	2	-	-	-	-	-	3	-
20A3051L.5	-	-	3	3	2	-	-	-	-	2	-	-	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Computer Networks Lab
Category PCC (LAB)
Couse Code 20A552L

Year III B. Tech
Semester I Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Exercise 1: Simulate network topologies Star, Bus, Mesh and Ring using Packet Tracer Tool.
Exercise 2: Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
Learning Outcomes: At the end of the module, the student will be able to:

- Write programs that can take character and bits as inputs and shows output in Stuffed formats. (L3)

Exercise 3: Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
Exercise 4: Implement Dijkstra's algorithm to compute the Shortest path through a graph.
Learning Outcomes: At the end of the module, the student will be able to:

- Apply and analyze CRC Polynomials with different examples (L3, L4)
- Implement Dijkstra's Algorithm for finding the shortest path (L5)

Exercise 5: Implement and simulate algorithm for Distance vector routing protocol.
Exercise 6: Implement and simulate algorithm for Link state routing protocol.
Learning Outcomes: At the end of the module, the student will be able to:

- Apply and analyze the Algorithm for Distance and Link state Routing Protocol. (L3, L4)

Exercise 7: Install network simulator NS-2 in any of the Linux operating system and simulate wired and wireless scenarios
Learning Outcomes: At the end of the module, the student will be able to:

- Implement NS2 simulator and compare wired and wireless scenarios. (L2, L5)

Exercise 8: Using Wireshark observe data transferred in client server communication using UDP and identify the UDP datagram
Exercise 9: Using Wireshark observe Three Way Handshaking Connection Establishment, Data Transfer and Three-Way Handshaking Connection Termination in client server communication using TCP.
Learning Outcomes: At the end of the module, the student will be able to:

- Implement wireshark and observe data transfer (L5)
- Implement wireshark and Observe Three Way Handshaking (L5)

Exercise 10: Design and configure a network with multiple subnets with wired and wireless LANs using required network devices. Configure the following services in the network- TELNET, SSH, FTP server, Web server, File server, DHCP server and DNS server.
Exercise 11: Implement Simple Mail Transfer Protocol.
Learning Outcomes: At the end of the module, the student will be able to:

- Apply and analyze the Services in the Networks. (L3, L4)

Task Resources:

1. Behrouz A. Forouzan "Data Communication and Networking", Tata McGraw- Hill Fifth Edition 2013.
2. L.Peterson and Bruce S.Davie, "Computer Networks" , Elsevier 5th Edition 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Classify different Network topologies and apply Packet tracker tool.	L2, L3
2. Apply and Analyze different algorithms to Find the Shortest Path	L3,L4
3. Demonstrate Network simulator and compare wired and Wireless scenarios.	L2
4. Design simple data transmission using networking concepts and implement.	L6
5. Compare and analyze different existing protocols	L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A552L.1	3	3	3	-	3	-	-	-	-	-	2	-	-	3	3
20A552L.2	3	3	3	3	3	1			1	1			1	3	
20A552L.3	3	3	3	3	3									3	3
20A552L.4	3	3	3	3	3									3	3
20A552L.5	3	3	3		3						2			3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course R Programming
Category SC – Skill Oriented Course
Couse Code 20A3052L

Year III B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:
- Understand the R programming environment.
- Understand the basics like constructs, control statements.
- Understand and apply the functions, string manipulations, vectors, matrices in different applications
- Learn the data frames and apply loading, retrieval techniques of data.
- Implements how data is analyzed and visualized using statistic functions.

Module 1 Introduction **8**

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf.

Learning Outcomes: At the end of the Module, the student will be able to:
- Understand the R programming concepts (L2)
- How to make use of R packages for problem solving (L3)

Module 2 **8**

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame
R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables
R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators.
R Decision Making: if statement, if – else statement, if – else if statement, switch statement
R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement
Learning Outcomes: At the end of the Module, the student will be able to:
- Know the data types and variables used in R programming (L2)
- Understand the functioning of control statements and loops in R programming (L2)

Module 3 **10**

R-Function : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values
R-Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower()
R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling**,** vector element sorting
R List -Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector
R Matrices – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division
R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements
R Factors –creating factors, generating factor levels gl()

Learning Outcomes: At the end of the Module, the student will be able to:
- Know the functions, strings and vectors and their implementation R programming (L2)
- Understand and apply list and matrices in R programming (L2)

Module 4 **10**

Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - **R-CSV Files -** Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – **R -Excel File** – Reading the Excel file

Learning Outcomes: At the end of the Module, the student will be able to:

- Create data frames and apply for manipulating data values in R programming (L3, L6)
- Understand loading and handling data in R programming (L2)

Module 5 **9**

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode **- Standard Deviation – Correlation - Spotting Problems in Data with Visualization:** visually Checking Distributions for a single Variable **- R –Pie Charts**: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – **R Histograms** – Density Plot - **R – Bar Charts**: Bar Chart Labels, Title and Colors.

Learning Outcomes: At the end of the Module, the student will be able to:

- Apply statistics for data manipulation in R programming (L3)
- Understand, apply and design visual representations in R programming (L2)

Prescribed Text Books:

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN : 978-93-5260-455-5
2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8

Reference Books:

1. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8
2. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), *R Programming*, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the environment requirements for R programming.	L2
2. Understand the basics like constructs, control statements.	L2
3. Understand and apply the functions, string manipulations, vectors, matrices in different applications	L2, L3
4. Learn the data frames and apply loading, retrieval techniques of data.	L2, L3
5. Implements how data is analyzed and visualized using statistic functions.	L4, L5, L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3052L.1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	-
20A3052L.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3052L.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3052L.4	3	3	3	-	3	-	-	-	-	-	-	3	3	3	-
20A3052L.5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Essence of Indian Traditional Knowledge
Category	MC
Couse Code	20AC53T
Year	III B. Tech.
Semester	I Semester
Branch	CSE, CE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	0

Course Objectives:

- To learn basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.
- To understand Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature in modern society with rapid technological advancements and societal disruptions.
- To understand Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.
- To understand Indian philosophical traditions, Indian linguistic Tradition, and Indian artistic tradition.

Unit 1 10

Indian Tradition: Fundamental unity of India, India's heroic role in world civilization, The Indian way of life, Introduction to Indian tradition, The Scientific Outlook and Human Values.

Learning Outcomes: At the end of the unit, the student will be able to:

- Appreciate incorporated traditions in Indian culture
- Understand the value of culture and traditions in leading peaceful life
- Understand the hidden scientific outlook and imbibed human values in the Indian way of life

Unit 2 10

Basic structure of Indian Knowledge System: Indian Traditional Scriptures, Exposure to 4-Vedas (the Rigveda, the Yajurveda, the Samaveda and the Atharvaveda) , 4-Upvedas (Ayurveda, Dhanurveda, Gandharvaveda, Sthapatya etc.), 6-Vedangas (Shiksha, Kalp, Nirukta, Vyakaran, Jyotish), 6-Upangas (Dharmashastra, Meemansa, Puranas, Tarkashastra/Logic) etc.

Learning Outcomes: At the end of the unit, the student will be able to:

- Grasp basic structure of Indian knowledge system
- Understand the essence of Vedas and their value
- Understand the systematic classification of holy scriptures

Unit 3 10

Indian Knowledge System and Modern Science: Relevance of Science and Spirituality, Science and Technology in Ancient India, Superior intelligence of Indian sages and scientists.

Indian Traditional Health Care: Importance and Practice of Yoga, Pranayama and other prevailing health care techniques.

Learning Outcomes: At the end of the unit, the student will be able to:

- Establish connection between Indian knowledge system and Modern science
- Understand spirituality in relation to science
- Appreciate the superior intelligence of Indian saints and scientists

Unit 4 8

Indian Artistic Tradition: Introduction and overview of significant art forms in ancient India such as painting, sculpture, Civil Engineering, Architecture, Music, Dance, Literature etc.

Indian Linguistic Tradition: Ancient Indian languages and literary Heritages, Phonology, Morphology, Syntax and Semantics.

Learning Outcomes: At the end of the unit, the student will be able to:

- Get an overview of significant art forms of ancient India
- Understand pioneering efforts of ancient civil engineering technology
- Trace the basic Indian linguistic tradition

10

Unit 5

Indian Philosophical Tradition: (Sarvadarshan)- Nyaya, Viaisheshiika, Sankhya, Yoga, Meemansa, Brief understanding of Philosophy of Charvaka, Bhagwan Mahaveer Jain, Bhagwan Buddha, Kabeer, Guru Nanak Dev and other eminent ancient Indian Philosophers.

Activities: Activities will consist of one assignment on each module, group discussions, presentations, case study on various topics based on above curriculum

Learning Outcomes: At the end of the unit, the student will be able to:

- Find the essence of Indian philosophical tradition
- Assimilate the philosophical speculations of different sects and the preachings of eminent philosophers of ancient days

Prescribed Text Books

1. Ajwani L.H., Immortal India, Vora & Co. Publishers, 1997.
2. Swami Jitmananda, Modern Physics and Vedanta, Bharatiya Vidya Bhavan, 2004.
3. Krishnamurthy,V. Science and Spirituality- A Vedanta Perception, Bharatiya Vidya Bhavan, 2002.
4. Sharma D.S., The Upanishads- An Anthology, Bharatiya Vidya Bhavan, 1989.
5. Raman V.V., Glimpses of Indian Heritage, Popular Prakashan,1993.

Reference Books:

1. Sivaramakrishnan, V., Cultural Heritage of India- Course Material, Bharatiya Vidya Bhavan, Mumbai, 5 th Edition, 2014.
2. Capra F., Tao of Physics, Shambhala, 2010.
3. Chaterjee S.C. and Datta D.M., An Introduction to Indian Philosophy, University of Calcutta, 1984.
4. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.
5. Jha V.N., Language, Thought and Reality.

Course Outcomes: Upon successful completion of the course, student will be able to	Bloom's Level of Learning
1. Explain basics of Indian tradition and Indian traditional knowledge systems.	L3
2. Describe basics of Indian traditional health care, technologies and its scientific perspectives.	L3
3. Explain basics of Indian artistic, linguistic and philosophical tradition.	L3
4. Co-relate the Indian traditional knowledge in modern scientific perspective.	L4

COs-POs-PSOs Mapping Table:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC53T.1	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC53T.4	-	-	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Automata and Compiler Design
Category PCC
Couse Code 20A3061T

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To learn deterministic and non-deterministic machines
- To specify and analyze the lexical, syntactic and semantic structure
- To organize bottom up parser and type checking
- To describe the techniques for intermediate code generator
- To distinguish different optimization techniques and design object code generation algorithms in the design of compiler

Unit 1 Introduction To Automata **9**

Introduction to Formal Languages, Chomsky hierarchy of languages and recognizers, Finite Automata – DFA, NFA, Conversion of NFA into DFA, Minimization of DFA, Regular Expressions, Conversion of Regular Expression to NFA, Applications of Finite Automata.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply automata theory and knowledge on formal languages (L3)
- Describe the applications of finite automata (L2)

Unit 2 Introduction to Compilers **9**

Introduction yo Compiler: Phases of Compiler, Interpreters

Lexical Analyzer: Input Buffering, Scanning Algorithm, LEX Tools

Context Free Grammars and Parsing: Context free grammars, derivation, parse trees, ambiguity, Top- Down Parser, Recursive Parser, Recursive Descent Parser, and LL(K) grammars.

Learning Outcomes: At the end of the unit, the student will be able to

- Describe the design of a compiler including its phases and components. (L2)
- Understand the roles of a compiler and Solve the Problems of Top down Parsing. (L2, L6)

Unit 3 **9**

Bottom -Up Parsing: Model of LR Parser, Shift Reduce Parser, SLR Parser, CLR Parser, LALR parser, YACC programming specification, Syntax directed translation, S-attributed and L-attributed grammars.

Type Checking: Specification of simple type checker, equivalence of type expressions, type conversions, overloading of functions and operations, Type Inference and Polymorphic Functions.

Learning Outcomes: At the end of the unit, the student will be able to:

- Differentiate SLR, CLR, and LALR Parsers. (L3)
- Understand the significance of Type checking (L2)

Unit 4 **9**

Intermediate Code Generation: Forms of Intermediate Code, Abstract syntax tree, translation of simple statements and control flow statements.

Runtime Storage: Storage organization, storage allocation strategies, Symbol Table Organization, dynamic storage allocation.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe various types of Intermediate forms of Representation. (L2)
- Use Storage allocation Strategies. (L3)

Unit 5 **9**

Code Optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

Code Generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment, DAG representation of basic block.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand to optimize and effectively generate machine codes. (L2)
- Implement the basic blocks, draw flow graphs and represent directed acyclic graphs. (L3)

Prescribed Text Books:

1. Hopcraft H.E and Ullman J.D., Introduction to Automata Theory, Languages and computation. Pearson education.
2. Aho, Ullman, Ravisethi, Compilers Principles, Techniques and Tools. Pearson Education.

Reference Books:

1. C. Andrew, W.Appel, Modern Compiler Construction, Cambridge University Press.
2. Louden, Compiler Construction, Cengage Learning.
3. V.Raghavan, Principles of Compiler Design, TMH.
4. Kamala Krithivasan and Rama R, Introduction to Formal Languages and Automata Theory and Computation. Pearson.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Construct finite state diagrams while solving problems of computer science	L6
2. Evaluate top down parser and bottom up parser	L5
3. Implement intermediate code forms and run time storage.	L3
4. Apply different optimization techniques and develop code generation algorithms in the design of compiler	L3, L6
5. Able to use the tools related to compiler design effectively and efficiently	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3061T.1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061T.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061T.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061T.4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061T.5	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Machine Learning
Category PCC
Couse Code 20A3062T

Year III B.Tech
Semester II Semester
Branch CSE & AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Formulate machine learning problems corresponding to different applications.
- Understand machine learning algorithms along with their strengths and weaknesses.
- Understand the basic theory underlying machine learning.
- Apply machine learning algorithms to solve problems of moderate complexity.
- Understand different types of learning approaches.

Unit 1 Introduction **9**

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

Learning Outcomes: At the end of the unit, the student will be able to:

- Explore how to build computer programs that improve their performance at some task through experience. (L4)
- Analyze sample complexity and computational complexity for several learning Problems (L4)

Unit 2 Decision Tree learning & Artificial Neural Networks **9**

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptrons, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data (L4)
- Analyze and solves learning problem using Decision Tree (L5)

Unit 3 Bayesian learning & Genetic Algorithms **9**

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply the principles of Probability for classification as an important area of Machine Learning Algorithms (L3)
- Illustrates the use of the genetic algorithm approach, and examine the nature of its hypothesis space search (L3)

Unit 4 Learning Sets of Rules & Analytical Learning 9

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze the Instance based algorithms can be used to overcome memory complexity and overfitting problems. (L4)
- Infer the significance of Domain Theories (L2)

Unit 5 Reinforcement Learning 9

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

Learning Outcomes: At the end of the unit, the student will be able to:

- Infer that the combined methods outperform both purely inductive and purely analytical learning methods (L3)
- Recognize the importance of Reinforcement Learning in the industry (L1)

Prescribed Text Books:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC) Reference

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basic knowledge about the key algorithms of machine learning	L1
2. Learn and use different machine learning algorithms	L2
3. Apply various machine learning algorithms Bayesian learning and genetic approaches	L3
4. Design the classification, pattern recognition, optimization and decision problems using machine learning algorithms	L4
5. Analyze different types of learning approaches	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3062T-1	3	3	3	1	-	1	-	-	1	-	-	3	3	3	-
20A3062T-2	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-
20A3062T-3	3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
20A3062T-4	3	3	3	-	-	-	-	-	-	-	-	3	3	-	-
20A3062T-5	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Big Data Analytics
Category PCC
Couse Code 20A3063T

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understand the basic concepts and importance of Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment
- Explore the concepts of Pig, Hive, Spark and HBase

Unit 1 Introduction to Big Data **9**

What is Big Data? Why Big Data is Important? Meet Hadoop, Data, Data Storage and Analysis, Comparison with other systems, History of Apache Hadoop, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the characteristics of datasets. (L3)
- Compare trivial data and big data for various applications. (L4)

Unit 2 HDFS and MapReduce **9**

HDFS: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow.

MapReduce: Developing a MapReduce application, The Configuration API, Setting up the Development Environment, Running Locally on Test Data, Running on a Cluster

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and apply scaling up Hadoop techniques and associated technologies. (L2)
- Apply the MapReduce application on a cluster. (L3)

Unit 3 **9**

How MapReduce Works: Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, Task Execution.

MapReduce Types and Formats: MapReduce Types, Input formats, output formats

Learning Outcomes: At the end of the unit, the student will be able to:

- Explore the Anatomy of MapReduce. (L5)
- Illustrate various input and output formats of MapReduce. (L2)

Unit 4 Hadoop Environment **9**

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security.

Pig: Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, UserDefined Functions, Data Processing Operators.

Learning Outcomes: At the end of the unit, the student will be able to:

- Demonstrate the Configure the Hadoop. (L2)
- Compare Hadoop with various Databases (L5)

Unit 5 **9**

Hive: Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.
Spark: Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a Spark Job Run.
HBase: HBasics, Installation, clients, Building an Online Query Application.
Learning Outcomes: At the end of the unit, the student will be able to:

- Understands various frameworks of Big Data. (L2)
- Compare Hive with traditional Databases. (L4)

Prescribed Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015
2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Co Series

Reference Books:

1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big Data Glossary, O'Reilly, 2011
2. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012
4. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the concepts and challenges of big data	L2
2. Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data.	L2
3. Apply large-scale analytic tools to solve some of the open big data problems.	L3
4. Analyze the impact of big data for business decisions and strategies.	L4
5. Design different big data applications.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3063T-1	3	3	-	-	3	-	-	-	-	-	-	-	3	3	3
20A3063T-2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
20A3063T-3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
20A3063T-4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
20A3063T-5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Artificial Neural Networks
Category PEC
Couse Code 20A306AT

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To explain the basic concepts of Neural Networks and applications.
- To Understand and develop single and multi-layer perceptron models.
- To use unsupervised learning of ANN
- To understand the advanced concepts of unsupervised learning.
- To Differentiate the types of Associative memory networks

Unit 1 Introduction **9**

History Of Neural Networks, Structure and Functions of Biological qnd Artificial Neuron, Neural Network Architectures, Characteristics Of ANN, Basic Learning Laws and Methods.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand important concepts and theory of ANN. (L2)
- Formalize the problems to solve using ANN (L6)

Unit 2 Supervised Learning **9**

Single Layer Neural Network and architecture, McCulloch-Pitts Neuron Model, Learning Rules, Perceptron Model, Perceptron Convergence Theorem, Delta learning rule, ADALINE, Multi-Layer Neural Network and architecture, MADALINE, Back Propagation learning, Back Propagation Algorithm.

Learning Outcomes: At the end of the unit, the student will be able to:

- Develop different single and multi-layer perceptron models (L6)
- Understand the basic functioning of Back propagation (L2)

Unit 3 Unsupervised Learning - 1 **9**

Outstar Learning, Kohenen Self Organization Networks, Hamming Network And MAXNET, Learning Vector Quantization, Mexican hat.

Learning Outcomes: At the end of the unit, the student will be able to:

- Make use of hamming network and MAXNET (L3)
- Understand and apply learning vector quantization (L3)

Unit 4 Unsupervised Learning - 2 **9**

Counter Propagation Network -Full Counter Propagation network, Forward Only Counter Propagation Network, Adaptive Resonance Theory (ART) -Architecture, Algorithms.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of advanced unsupervised learning (L2)
- Describe Adaptive Resonance Theory architectures (L2)

Unit 5 Associative Memory Networks **9**

Introduction, Auto Associative Memory, Hetero Associative Memory, Bidirectional Associative Memory (BAM) - Theory and Architecture, BAM Training Algorithm, Hopfield Network: Introduction, Architecture of Hopfield Network.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of Bidirectional Associative Memory. (L2)
- Differentiate the auto, Hetiro and bidirectional associative memory (L3)

Prescribed Text Books:

1. B.Yegnanarayana" Artificial neural networks" PHI ,NewDelhi
2. S.N.Sivanandam ,S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", TATA MCGraw- Hill publications
3. J .M. Zurada ,"Introduction to Artificial neural systems" –Jaico publishing

Reference Books:

1. S.Rajasekaran and G.A.Vijayalakshmi pai "Neural Networks.Fuzzy Logic and genetic Algorithms"
2. James A Freeman and Davis Skapura" Neural Networks Algorithm, applications and programming Techniques", Pearson Education, 2002
3. Simon Hakins "Neural Networks " Pearson Education.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Distinguish different types of ANN architectures	L2
2. Discuss feed forward networks and their training issues	L2
3. Know and apply methods of training neural networks	L3
4. Learn how to solve practical problems using ANN techniques	L1
5. Identify and differentiate the types of Associative memory networks	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A306AT-1	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A306AT-2	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A306AT-3	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A306AT-4	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3
20A306AT-5	3	3	3	-	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Cryptography and Network Security
Category PEC
Couse Code 20A56BT

Year III B. Tech
Semester II Semester
Branch CSE, AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- This course focuses on the fundamentals of cryptography and its application to network security.
- The course also focuses on the practical network security applications that have been implemented and are in use to provide email and web security.
- The learners also acquire knowledge of digital signature, authentication, firewalls, intrusion detection techniques.

Unit 1 **8**

Introduction to Computer Security Concepts: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, A Model for Network Security Standards

Learning Outcomes: At the end of the unit, the student will be able to

- Analyze the cause for classical network attacks and describe the working of various advanced security controls.(L4)
- Explain the importance and application of each of Confidentiality, Integrity, and Availability.(L3)
- Understand the basic categories of threats to computers and networks.(L1)

Unit 2 **12**

Block Ciphers and the Data Encryption Standard: Traditional Block Cipher Structure, The Data Encryption Standard, A DES Example, AES Structure, An AES Example, Multiple Encryption and Triple DES, Electronic Codebook, Cipher Block Chaining Mode, Cipher Feedback Mode Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze and design classical encryption techniques and block ciphers (L4).
- Understand and analyze public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key Exchange.(L1)

Unit 3 **12**

Cryptographic Data Integrity Algorithms and User Authentication: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm. Message Authentication Requirements, Requirements for Message Authentication Codes, HMAC, Digital Signatures User Authentication: Kerberos version 4

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand key management and distribution schemes and design User Authentication Protocols.(L1)
- Analyze and design hash and MAC algorithms, and digital signatures.(L4)

Unit 4 **8**

Network and Internet Security : Web Security Considerations, Transport Layer Security, Email Security, S/MIME, Pretty Good Privacy

Learning Outcomes: At the end of the unit, the student will be able to:

- Design network application security schemes, such as PGP, S/MIME, TLS.(L5)
- Explore the attacks and controls associated with transport-level, web and E-mail security(L5)

Unit 5 **10**

IP Security and System Security: IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload.

System Security: Intruders, Intrusion Detection, Password Management, Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks, Firewalls

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the enhancements made to IPv4 by IPSec.(L1)
- Know about Intruders and Intruder Detection mechanisms, Types of Malicious software(L2)
- Acquire Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.(L4)

Prescribed Textbooks:

1. William Stallings, Cryptography and Network security, Pearson Education, 4th ed
2. William Stallings, Network Security Essentials (Applications and Standards), Pearson, Fourth Edition.

Reference Books:

1. Charlie Kaufman, Radis Perlman, and Mike Speciner, "Network Security – Private Communication in a Public World" 2nd ed., Pearson Education, 2003
2. J.W. Rittiaghouse and William M.Hancok, Cyber Security Operations Handbook, Elseviers.
3. Behrouz A. Forouzan, Cryptography & Network Security, McGraw Hill

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand computer security concepts and security threats	L1, L2
2. Apply knowledge of encryption algorithms to protect data	L2, L3
3. Perform data integrity and user authentication	L3, L4
4. Examine security protocols for web security	L2, L3
5. Apply knowledge of IP security and system security	L2, L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
20A56BT.1	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
20A56BT.2	3	-	3	-	3	-	-	-	-	-	-	3	3	3	-
20A56BT.3	2	-	2	-	3	-	-	-	-	-	-	3	3	3	-
20A56BT.4	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3
20A56BT.5	3	-	3	-	3	-	-	-	-	-	-	3	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Advanced Data Mining
Category PEC
Couse Code 20A306CT

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To develop the abilities of critical analysis to data mining systems and applications.
- To apply statistical and data mining to large data volumes.
- To select a suitable model for a given statistical problem and data set.
- To Critique graph mining and web mining problems.
- To discuss distributed data mining framework and techniques.

Unit 1 Introduction **9**

Introduction about data mining, Need of data mining, Business data mining, data mining tools, Data Mining Process: CRISP Data Mining, Business Understanding, data understanding and data preparation, modeling, evaluation and deployment, SEMMAS Process, Data mining applications, comparison of CRISP & SEMMA.

Learning Outcomes: At the end of the unit, the student will be able to:

- Deals with data issues that will be need for successful application of data (L1)
- Understand the data mining process (L2)

Unit 2 **9**

Association Rules in Knowledge Discovery, Market-Basket Analysis, and Market Basket Analysis Benefits Demonstration on Small Set of Data, Real Market Basket Data The Counting Method Without Software.

Sequential Pattern Mining concepts, primitives, scalable methods; Transactional Patterns and other temporal based frequent patterns.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basics of Association Rule mining in knowledge discovery (L2)
- Make use of advanced statistical and data mining to analyze large data bases (L3)

Unit 3 **9**

Support Vector Machines, Formal Explanation of SVM, Primal Form, Dual Form, Soft Margin, Non-linear Classification, Regression, implementation, Kernel Trick. Use of SVM–A Process-Based Approach, Support Vector Machines versus Artificial Neural Networks, Disadvantages of Support Vector Machines, Genetic Algorithm Support to Data Mining, Demonstration of Genetic Algorithm, Application of Genetic Algorithms in Data Mining.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply suitable model for problem solving (L3)
- Understand statistical logic of data mining algorithms (L2)

Unit 4 **10**

Graph Mining, Mining frequent subgraphs, finding clusters, hub and outliers in large graphs, Graph Partitioning; **Web Mining**, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining; Social Network Analysis, characteristics of social Networks.

Performance Evaluation for Predictive Modeling, Performance Metrics for Predictive Modeling, Estimation Methodology for Classification Models, Simple Split, The *k*-Fold Cross Validation Bootstrapping and Jackknifing, Area Under the ROC Curve.

Learning Outcomes: At the end of the unit, the student will be able to:

- Formulate and solve graph related problems (L6)
- Understands the performance evaluation process and measurement (L2)

Unit 5 **10**

Distributed Data Mining, Distribute data mining framework, Distributed data source, Distributed data mining techniques, Distributed classifier learning, distributed clustering, distributed association rule mining and Challenges of distributed data mining;

Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem;

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand distributed data mining framework (L2)
- Describe the mining data steams (L2)

Prescribed Text Books:

1. David L. Olson (Author), DursunDelen., "Advanced Data Mining Techniques", 2017
2. Jaiwei Han, Micheline Kamber and Jian Pei, "Data Mining concepts and techniques", 3rd Edition, MK publisher

Reference Books:

1. Advances in data mining and modeling by Wai-Ki ChingMichael Kwok-Po Ng
2. Advanced Techniques in Knowledge Discovery and Data Mining edited by Nikhil R. Pal, Lakhmi C Jain
3. Dynamic and Advanced Data Mining for Progressing Technological Development: Innovations and Systemic Approaches A B M Shawkat Ali (Central Queensland University, Australia) and Yang Xiang (Central Queensland University, Australia)

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understands the fundamentals concepts of data mining	L2
2. Apply Association rules and sequential pattern mining concepts in data mining	L3
3. Apply SVM based classification for large datasets.	L3
4. Formulate and solve the graph and web related problems using graph and web mining	L5, L6
5. Describe the basic concepts of Distributed data mining	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A306CT.1	3	-	3	-	-	-	-	-	-	-	-	3	3	3	3
20A306CT.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A306CT.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A306CT.4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A306CT.5	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Natural Language Processing
Category PEC
Couse Code 20A306DT

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- Able to explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Understand approaches to syntax and semantics in NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand language modeling.
- Understand machine learning techniques used in NLP.

Unit 1 Introduction to Natural language **9**

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the basic concepts of Natural Language processing (L2)
- Analyze the different levels of language analysis (L4)

Unit 2 Grammars and Parsing **9**

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Learning Outcomes: At the end of the unit, the student will be able to:
- Describe the grammars and parsing techniques (L2)
- Differentiate the types of parsing and Grammars (L2)

Unit 3 Grammars for Natural Language **9**

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers

Learning Outcomes: At the end of the unit, the student will be able to:
- Describe the approaches for machine translation (L2)
- Understand the types of parsers (L2)

Unit 4 Semantic Interpretation and Language Modelling **9**

Semantic Interpretation: Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling: Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross-lingual Language Modeling.

Learning Outcomes: At the end of the unit, the student will be able to:
- Discuss the semantic interpretation in Natural Language processing (L2)
- List and understand the types of language models (L1, L2)

Unit 5 Machine Translation and Multilingual Information Retrieval 9

Machine Translation: Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status.

Multilingual Information Retrieval: Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization: Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the machine translation in NLP (L2)
- Apply multilingual information retrieval in NLP (L3)

Prescribed Text Books:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education
2. Daniel M.Bikel and Imed Zitouni "Multilingual Natural Language Processing Applications : From Theory To Practice" Pearson Publications

Reference Books:

1. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineet Chaitanya, Prentice –Hall of India
2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993
3. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008
4. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understanding the syntactic and semantics of NLP	L2
2. Use appropriate grammars and parsers to communicate the problems and their solutions	L3
3. Understand the grammars in NLP	L2
4. Describe the semantic interpretation and language modelling	L2
5. Understand and apply machine learning translation and retrieval in NLP	L2, L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A306DT-1	3	-	3	-	-	-	-	-	-	-	-	3	3	3	3
20A306DT-2	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A306DT-3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A306DT-4	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A306DT-5	3	3	3	-	1	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Automata and Compiler Design Lab
Category PCC (LAB)
Course Code 20A3061L

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: Students will write a program for

- To learn deterministic and non-deterministic machines
- Explain the importance of compiler design.
- Design and implementation of lexical analyzer using Lex tools.
- Design compiler components.
- Enlighten the student with knowledge base in compiler design and its applications.

List of Programs

Exercise 1: Write a program to Deterministic Finite Automata (DFA).
Exercise 2: Write a program to FA to regular grammar conversion.
Learning Outcomes: At the end of the module, the student will be able to:

- Design a DFA for a task (L6)
- Apply automata theory and knowledge on formal languages (L3)

Exercise 3: Write a program to Converting CFG to PDA (LL)
Exercise 4: Write a program to Construct a Lexical Analyzer for validating identifiers, operators, comments, looping statements, key words.
Exercise 5: Write a program to compute FIRST and FOLLOW sets
Learning Outcomes: At the end of the module, the student will be able to:

- Implement language conversion(L6)
- Implement LEX analyzer and evaluate FIRST and FOLLOW (L5, L6)

Exercise 6: Write a program to construct a Recursive Parser.
Exercise 7: Write a program to construct a Recursive Descent Parser.
Learning Outcomes: At the end of the module, the student will be able to:

- Solve the Problems of Top down Parsing (L6)
- Implement LL parsers (L6)

Exercise 8: Write a program to remove left factoring.
Exercise 9: Write a program to remove left recursion
Learning Outcomes: At the end of the module, the student will be able to:

- Solve the Problem of left factoring (L5, L6)
- Solve the problem of left recursion (L5, L6)

Exercise 10: Write a program to implement Bottom-up parsers.
Exercise 11: Write a program for intermediate representations.
Learning Outcomes: At the end of the module, the student will be able to:

- Implement SLR, CLR, and LALR Parsers (L6)
- Implement various types of Intermediate representations (L6)

Prescribed Text Books:

1. Hopcraft H.E and Ullman J.D., Introduction to Automata Theory, Languages and computation. Pearson education.
2. Principles of compiler design -A.V. Aho. J.D.Ullman; Pearson Education.
3. Lex&yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly.

Reference Books:

1. C. Andrew, W.Appel, Modern Compiler Construction, Cambridge University Press.
2. Louden, Compiler Construction, Cengage Learning.
3. V.Raghavan, Principles of Compiler Design, TMH.
4. Kamala Krithivasan and Rama R, Introduction to Formal Languages and Automata Theory and Computation. Pearson.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Construct finite state diagrams while solving problems of computer science	L6
2. Design a LEX analyzer for identification of tokens and lexemes	L6
3. Design Recursive Descent parser for the given language	L6
4. Evaluate top down parser and bottom up parser	L5
5. Implement intermediate code forms and run time storage.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3061L.1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061L.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061L.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061L.4	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A3061L.5	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Machine Learning Lab
Category PCC (LAB)
Course Code 20A3062L

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: Students will write a program for

- Formulate machine learning problems corresponding to different applications
- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice
- implement different types of learning approaches
- Understand machine learning algorithms along with their strengths and weaknesses.

List of Programs

Exercise 1: Introduction to Python-based notebook environments.
Exercise 2: Implement A* algorithm for one the following problems: i) 8 puzzle ii) Missionaries and Cannibals
Learning Outcomes: At the end of the module, the student will be able to:

- Explore and build computer program that improve their performance of a task through experience. (L4)
- Implements AI based search strategy for 8-puzzle and Missionaries and Cannibals problem (L6)

Exercise 3: Implement and test hill climbing based search algorithms to solve Travelling Salesman Problem
Exercise 4: Solve and implement map coloring problem by backtracking and constraint propagation
Exercise 5: Solve and implement the game of tic-tac-toe using mini-max
Learning Outcomes: At the end of the module, the student will be able to:

- Implements AI based search strategy for travelling salesmen problem (L6)
- Implements AI based search strategy for backtracking and tic-tac-toe (L6)

Exercise 6: 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 use it to classify a new sample
Exercise 7: Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
Learning Outcomes: At the end of the module, the student will be able to:

- solves learning problem using Decision Tree (L5)
- implements learning problem using Backpropogation (L5)

Exercise 8: Write a program to implement the naive Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. Calculate the accuracy, precision, and recall for your data set.

Exercise 9: Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using any standard Heart Disease Data Set.
Learning Outcomes: At the end of the module, the student will be able to:

- implement the principles of Bayes Probability for classification (L6)
- Demonstrate the diagnosis of heart patients using any standard Heart Disease Data Set (L3)

Exercise 10: 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.

Exercise 11: Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions

Learning Outcomes: At the end of the module, the student will be able to:

- Apply the principles of Probability for classification as an important area of Machine Learning Algorithms (L3)
- Demonstrate the K-nearest neighbor algorithm on iris data and evaluate its performance. (L3, L5)

Exercise 12: Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw the corresponding graphs.

Exercise 13: Write a program to implement 5-fold cross validation on a given dataset. Compare the accuracy, precision, recall, and F-score for your data set for different folds.

Exercise 14: write a simple program to implement Reinforcement Learning.

Learning Outcomes: At the end of the module, the student will be able to:

- Implements Locally Weighted Regression algorithm and k-fold cross validation on a given dataset. (L6).
- Implement RL on an industry related task. (L6).

Prescribed Text Books:

1. Machine Learning – Tom M. Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC) Reference

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basic knowledge about the key algorithms of machine learning	L1
2. Learn and use different machine learning algorithms	L2
3. Apply various machine learning algorithms Bayesian learning and genetic approaches	L3
4. Design the classification, pattern recognition, optimization and decision problems using machine learning algorithms	L4
5. Analyze different types of learning approaches	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3062L.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3062L.2	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A3062L.3	3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20A3062L.4	3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20A3062L.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Big Data Analytics Lab
Category PCC (LAB)
Course Code 20A3063L

Year III B.Tech
Semester II Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: Students will write a program for

- Understand the basic concepts and importance of Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment
- Explore the concepts of Pig, Hive, Spark and HBase

List of Programs

Exercise 1:

i. Installation of VMWare to setup the Hadoop environment and its ecosystems.
ii. Perform setting up and Installing Hadoop in its three operating modes.
   a. Standalone.
   b. Pseudo distributed.
   c. Fully distributed.

Learning Outcomes: At the end of the module, the student will be able to:

- Understand Hadoop Environment (L2)
- Learns about Hadoop installation (L1)

Exercise 2: Implement the following file management tasks in Hadoop:

i. Adding files and directories
ii. Retrieving files
iii. Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Exercise 3: Perform the following operations in HDFS.

i. Review the commands available for the Hadoop Distributed File System
ii. Copy file foo.txt from local disk to the user's directory in HDFS
iii. Get a directory listing of the user's home directory in HDFS
iv. Get a directory listing of the HDFS root directory
v. Display the contents of the HDFS file user/fred/bar.txt
vi. Move that file to the local disk, named as baz.txt
vii. Create a directory called input under the user's home directory
viii. Delete the directory input old and all its contents

Verify the copy by listing the directory contents in HDFS

Exercise 4: i) Run a basic word count Map Reduce program to understand Map Reduce Paradigm.
ii) Implement matrix multiplication with Hadoop Map Reduce

Exercise 5: Write a Map Reduce program that mines weather data.

Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

Learning Outcomes: At the end of the module, the student will be able to:

- Apply and implement HDFC concepts and associated technologies (L3, L6)
- Implement MapReduce concepts on different data and applications (L6)

Exercise 6:

i. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
ii. Run the Pig Latin Scripts to find Word Count
iii. Run the Pig Latin Scripts to find a max temp for each and every year.

Exercise 7: Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

Exercise 8: Implementing Bloom Filter using Map-Reduce.

Exercise 9: Implementing Frequent Item set algorithm using Map-Reduce.

Learning Outcomes: At the end of the module, the student will be able to:

- Gains the knowledge on Pig, Hive concepts and approaches (L1)
- Implements MapReduce concepts on frequent itemset mining (L6)

Exercise 10: Implementing Clustering algorithm using Map-Reduce

Exercise 11: Implementing Page Rank algorithm using Map-Reduce

Exercise 12: Case studies:

i. Case Study on Twitter data analysis
ii. Case Study on Fraud Detection

Exercise 13: Case Studies:

i. Case Study on Text Mining
ii. Case Study on Equity Analysis

Learning Outcomes: At the end of the module, the student will be able to:

- Understands and implements MapReduce concepts on various learning algorithms (L2, L6)
- Understands and implements various frameworks of Big Data (L2, L6)

Prescribed Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015
2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series

Reference Books:

1. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden,Big Data Glossary, O'Reilly, 2011
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012
3. Anand Rajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the concepts and challenges of big data	L2
2. Implements the operations viz. collect, manage, store, query, and analyze various forms of big data.	L6
3. Implement MapReduce analytic process to solve some of the open big data problems.	L3
4. Analyze the impact of big data for business decisions and strategies.	L4
5. Design different big data applications.	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A3063L.1	3	3	-	-	3	-	-	-	-	-	-	-	3	3	3
20A3063L.2	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
20A3063L.3	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
20A3063L.4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
20A3063L.5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Professional Communication
Category SC- Skill Advanced Course
Couse Code 20AC61L

Year III B. Tech.
Semester II Semester
Branch CSE, CE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	1	2	2

Course Objectives:

- To understand various strategies of resume building
- To understand interview process and be prepared for facing it
- To learn group discussion techniques
- To learn about professional writing and presentations
- To be aware of managerial skills

Syllabus

Résumé preparation: Structure, formats and styles – planning - defining career objective - projecting one's strengths and skills - creative self-marketing - sample résumés -cover letter.

Interview Skills: Concepts and process - pre-interview planning - preparation body language -answering strategies - frequently asked questions - mock interviews - students taking up the roles of interviewer and interviewee

Group Discussion: Communicating views and opinions - discussing - intervening - agreeing and disagreeing – asking for and giving clarifications – substantiating - providing solutions on any given topics across a cross – section of individuals - modulations of voice and clarity - body language - case study – observation of group behaviors – social etiquette

Presentation Skills (Individual and Team): Collection of data from various sources - planning, preparation, and practice - types of audience - attention-getting strategies – transitions - handling questions from audience **–** dealing with difficult audience

Technical Report Writing: Types of formats and styles, subject matter, clarity, coherence and style, planning – data collection and analysis, report preparation, preparation of figures and tables, references

Managerial skills: Personality traits such as integrity, accountability, assertiveness, adaptability, diplomacy and dynamism - innovative strategies for dealing with different people in different contexts - showcasing live examples, sharing anecdotes and inspiring quotes related to leadership qualities

Learning Resources: Soft Skills lab manual prepared by Dept. of H&S, AITS Rajampet

Course Outcomes: Upon successful completion of the course, students will be able to	Bloom's Level of Learning
1. Express themselves fluently in social and professional contexts.	L4
2. Make presentations confidently	L5
3. Face interviews confidently and to participate in meetings effectively	L4
4. Participate in group discussions confidently	L4
5. Write technical reports	L4
6. Lead a team as a manager of the group	L5

COs-POs-PSOs Mapping Table:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC61L.1	-	-	-		-	-	-	-	-	3	-	3
20AC61L.2	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.3	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.4	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.5	-	-	-	-	-	-	-	-	-	3	-	3
20AC61L.6	-	-	-	-	-	-	-	-	-	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	Constitution of India
Category	MC
Couse Code	20AC62T
Year	III B. Tech.
Semester	II Semester
Branch	CSE, CE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	0

Course Objectives:

- To understand the importance of the constitution
- To learn the structure of executive, legislature, and judiciary
- To understand the philosophy of fundamental rights and duties
- To learn the autonomous nature of constitutional bodies like the Supreme Court and High Court, Controller and Auditor General of India and Election Commission of India.
- To understand the union and state financial and administrative relations

Unit 1 **8**

Introduction to Indian Constitution: Constitution, meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the necessity of framed rules of constitution
- Understand the process of citizenship
- Distinguish fundamental rules from fundamental duties

Unit 2 **12**

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand administrative structure of union government
- Understand the federal nature of Indian Union
- Understand judicial structure at various levels

Unit 3 **10**

State Government and its Administration - Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the administrative structure of state government
- Know the power distribution between CM and Governor

Unit 4 **8**

Local Administration - District Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand district administrative structure
- Understand various kinds of local governance in practice
- Know the relevance of local administration in accomplishing grass-root democracy

Unit 5 **10**

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the autonomous role of ECI in conducting free and fair elections
- Need of various National commissions in the uplift of weaker sections

Prescribed Textbooks

1. Durga Das Basu, Introduction to the Constitution of India, Prentice-Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust

Reference Books

1. J.A. Siwach, Dynamics of Indian Government & Politics
2. D.C. Gupta, Indian Government and Politics
3. M.V. Pylee, India's Constitution

Course Outcomes:

Upon successful completion of the course, student will be able to	Blooms Level of Learning
1. Understand the historical background of the constitution making and its importance for building a democratic India.	L2
2. Understand the functioning of three wings of the government, i.e., executive, legislative and judiciary.	L2
3. Understand the value of the fundamental rights and duties for becoming good citizens of India.	L2
4. Understand the decentralization of power between union, state and local self-government.	L2
5. Understand the operation of constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	L2

COs-POs-PSOs Mapping Table:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC62T.1	-	-	-	-	-	-	-	-	-	-	-	2
20AC62T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC62T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC62T.4	-	-	-	-	-	-	-	-	-	-	-	2
20AC62T.5	-	-	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Deep Learning
Category PEC
Couse Code 20A307AT

Year IV B.Tech
Semester I Semester
Branch CSE & AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce students through some of the latest techniques in deep learning.
- To understand the internal designing of deep feed forward network and learning.
- To recognize convolution and recurrent neural networks.
- To Understand and apply different recurrent neural networks.
- To Hands on and the students should be able to design intelligent deep learning systems for solving the problems in the area of their interests.

Unit 1 Introduction **9**

Machine Learning Basics: Learning algorithms, supervised and unsupervised, building a machine learning algorithm, and challenges motivating deep learning.

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes

Learning Outcomes: At the end of the unit, the student will be able to: <

- Differentiate supervised and unsupervised machine learning algorithms (L4)
- Understand and different deep feed forward neural networks learning (L2)

Unit 2 Regularization for Deep Learning **9**

Regularization and Under Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multitask Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training,

Optimization for Training: Deep Models challenges in Neural Network Optimization, Basic Algorithms, Optimization Strategies and Meta-Algorithms

Learning Outcomes: At the end of the unit, the student will be able to:

- Define regularization model for deep learning (L1)
- Understand the optimization model for training deep models (L2).

Unit 3 Convolutional Networks **9**

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro-scientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the examples and architectures for classification with convolutional networks (L2)
- Implement convolutional neural networks models (L3)

Unit 4 Sequence Modelling **9**

Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, and Recursive Neural Networks. Long short-term memory

Learning Outcomes: At the end of the unit, the student will be able to:

- Illustrate the recurrent networks for sequential modelling applications (L3)
- Use the patterns for recurrent neural networks (L3)

Unit 5 Deep Generative models 9

Deep Belief Networks, Variational Autoencoders, Generative Adversarial Networks, Deep Convolutional GAN Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and design GAN and Deep GAN for real time environments (L2, L6)
- Perform deep leaning methods on multi deep learning applications (L3)

Prescribed Text Books:

1. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press

Reference Books:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations and Trends® in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346
2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science. Create Space Independent Publishing Platform
3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learning with R Version 1, Copyright 2017 Manning Publications.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basics of machine learning techniques.	L2
2. Describe the designing model of deep feed forward networks	L2
3. Implement the efficient convolution algorithms	L3
4. Understand various deep learning models such CNN, Autoencoders, RNN.	L2
5. Apply the deep learning methods in real time applications	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307AT.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307AT.2	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
20A307AT.3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307AT.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
20A307AT.5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Internet of Things
Category PEC
Couse Code 20A307BT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the fundamentals of Internet of Things
- To learn about the IoT architecture and protocols
- To build a small low cost embedded system using Raspberry Pi & Arduino
- To apply the concept of Internet of Things in the real world scenario
- To Analyze applications of IoT in real time scenario

Unit 1 Introduction to IOT **9**

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of Physical design, logical design and IoT enabling techniques. (L2)
- Demonstrate about domain specific IoTs, IoT System Management, IoT Platforms Design Methodology. (L2)

Unit 2 IOT Architecture **9**

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - Information model - Functional model - Communication model - IoT Reference architecture.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand different types of IoT architectures. (L2)
- Identify differences between different types of IoT models. (L3)

Unit 3 IoT Protocols **9**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP – Security

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze different types of protocols used in IoT systems. (L4)
- Acquire knowledge about protocols used in wireless personal area networks. (L2)

Unit 4 Building IoT with Raspberry PI & ARDUINO **9**

Building IOT with RASPBERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi Board - Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Other IoT Platforms – Arduino.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand how to develop IoT systems with Raspberry Pi using python programming. (L2)
- Develop IoT systems using IoT systems using Arduino. (L3)

Unit 5 Case Studies and Real-World Applications 9

Real world design constraints - Applications - Asset management, Industrial automation, Smart grid, Commercial building automation, Smart cities - Participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand real world constraints and case studies. (L2)
- Design basic IoT application of different domains. (L3)

Prescribed Text Books:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2012

Reference Books:

1. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011
2. Honbo Zhou,”The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012
3. Jan Holler, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Analyze various protocols for IoT	L4
2. Develop Web services to access/control IoT devices.	L3
3. Design a portable IoT using Raspberry Pi.	L6
4. Deploy an IoT application and connect to the cloud.	L5
5. Analyze applications of IoT in real time scenario	L4

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307BT.1	2	3	2	3	2	1	1	-	1	-	-	1	2	3	3
20A307BT.2	2	2	2	3	2	2	1	-	1	-	-	1	2	3	3
20A307BT.3	2	3	2	3	2	1	1	-	1	-	-	1	2	2	3
20A307BT.4	2	3	2	3	2	2	1	-	3	-	-	1	2	2	3
20A307BT.5	2	3	2	3	2	3	1	-	3	-	-	2	2	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Information Retrieval Systems
Category PEC
Couse Code 20A307CT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To learn the different models for information storage and retrieval
- To learn about the various retrieval utilities for improving search.
- To understand indexing and querying in information retrieval systems
- To expose the students to the notions of structured and semi structured data
- To learn about web search

Unit 1 Introduction **9**

Retrieval Strategies: Vector Space Model – Probabilistic Retrieval Strategies – Language Models – Inference Networks – Extended Boolean Retrieval – Latent Semantic Indexing – Neural Networks – Genetic Algorithms – Fuzzy Set Retrieval.

Learning Outcomes: At the end of the unit, the student will be able to:
- Describe different types of retrieval strategies. (L1)
- Understand about the genetic algorithms and fuzzy set retrieval. (L2)

Unit 2 Retrieval Utilities **9**

Relevance Feedback – Clustering – Passage-based Retrieval – N-grams – Regression Analysis – Thesauri – Semantic Networks – Parsing.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the retrieval utilities like Relevance Feedback, Clustering, Passage-based Retrieval, N-grams, and Regression Analysis. (L2)
- Explain semantic networks and parsing. (L2)

Unit 3 Cross-Language Information Retrieval **9**

Introduction – Crossing the Language Barrier – Cross-Language Retrieval strategies – Cross Language Utilities – Efficiency - Inverted Index – Query Processing – Signature Files – Duplicate Document Detection.

Integrating Structured Data and Text: Relational Model – Historical Progression –Relational Application – Semi-Structured Search – Multi-dimensional Data Model – Mediators.

Learning Outcomes: At the end of the unit, the student will be able to:
- Describe the Cross-Language Retrieval strategies and Cross Language Utilities. (L2)
- Understand the Integrating Structured Data and Text Model. (L2)

Unit 4 Parallel and Distributed Information Retrieval **9**

Parallel Information Retrieval: Parallel Text Scanning – Parallel Indexing – Clustering and Classification – Parallel Systems

Distributed Information Retrieval: Theoretical Model – Web Search – Result Fusion – Peer-to-Peer Information Systems – Architectures.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand parallel information systems. (L2)
- Illustrate distributed information retrieval systems (L2)

Unit 5 Web Based Retrieval 9

Web Search Basics – Indexing – Query Processing– Crawling– Ranking– Link Analysis: Page rank, Hubs and Authorities (HITS).

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand web search basics and query processing. (L2)
- Identify the use of ranking and link analysis in web-based retrieval systems. (L2)

Prescribed Text Books:

1. David A. Grossman, Ophir Frieder, "Information Retrieval: Algorithms, and Heuristics", Academic Press, Second Edition, 2008
2. Christopher D. Manning, Prabhakar Raghavan, Hinrich SchützeAn ,"Introduction to Information Retrieval" ,Cambridge University Press, Cambridge, England, 2009

Reference Books:

1. Ricardo Baeza-Yate, Berthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education Asia, 2012
2. G.G. Chowdhury, "Introduction to Modern Information Retrieval", Neal- Schuman Publishers, Third Edition, 2010
3. Daniel Jurafsky and James H. Martin, "Speech and Language Processing", Second Edition, Pearson Education, 2009
4. Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, "Text Information Retrieval Systems", Academic Press, Third Edition, 2007

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain Information retrieval system strategies	L2
2. Compare various types of retrieval utilities for improving search	L2
3. Explain cross-language information retrieval strategies	L2
4. Summarize various steps involved in information retrieval techniques	L2
5. Identify various web based information retrieval techniques using modern tools	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307CT.1	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
20A307CT-2	3	-	2	-	-	-	-	-	-	-	-	-	3	3	-
20A307CT-3	3	3	2	-	-	-	-	-	-	-	-	-	3	3	-
20A307CT-4	3	2	-	-	-	-	-	-	-	-	-	-	3	3	-
20A307CT-5	3	3	-	-	2	-	-	-	-	-	-	-	3	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Advanced Databases
Category PEC
Couse Code 20A307DT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To understand the design of databases
- To acquire knowledge on parallel and distributed databases and its applications
- To study the usage and applications of Object Oriented and Intelligent databases
- To understand the emerging databases like Mobile, XML and Multimedia
- To learn how to store varies types of data in multidimensional databases

Unit 1 Parallel and Distributed Databases 9

Introduction to Databases- Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism –Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies.

Learning Outcomes: At the end of the unit, the student will be able to

- Describes the fundamental concepts of distributed database(L2)
- Demonstrate the query processing in distributed database (L3)

Unit 2 Intelligent Databases 9

Active Databases: Syntax and Semantics (Starburst, Oracle, Db2)- Taxonomy Applications- Design Principles for Active Rules- Temporal Databases:

Overview of Temporal Databases TSQL2- Deductive Databases-Recursive Queries in SQL- Spatial Databases-Spatial Data Types - Spatial Relationships- Spatial Data Structures-Spatial Access Methods- Spatial DB Implementation

Learning Outcomes: At the end of the unit, the student will be able to:

- Design principles for active databases (L6)
- Implements the spatial database (L3)

Unit 3 XML Databases 9

XML Databases: XML Data Model – DTD – XML Schema – XML Querying – Web Databases – Open Database Connectivity.

Learning Outcomes: At the end of the unit, the student will be able to:

- Connect with open database (L6)
- Design and apply XML to create a markup language for data and document centric applications (L6)

Unit 4 Mobile Databases 9

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile

Transaction Models - Concurrency Control - Transaction Commit Protocols.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply and analyze issues related to transaction management in mobile databases (L3)
- Learn remote access to mobile database (L1)

Unit 5 Multimedia Databases 9

Multidimensional Data Structures – Image Databases – Text / Document Databases – Video Databases – Audio Databases – Multimedia Database Design.

Learning Outcomes: At the end of the unit, the student will be able to:

- Examines the multimedia data performance (L4)
- Learn about to store different formats of data in multimedia databases (L1)

Prescribed Text Books:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006
2. Carlo Zaniolo, Stefano Ceri, Christos Faloutsos, Richard T.Snodgrass, V.S.Subrahmanian, Roberto Zicari, "Advanced Database Systems", Morgan Kaufmann publishers,2006

Reference Books:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.
2. Vijay Kumar, "Mobile Database Systems", John Wiley & Sons, 2006.
3. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson, 2011.
4. Thomas Cannolly and Carolyn Begg,"Database Systems, A Practical Approach to Design, Implementation and Management", Fourth Edition, Pearson Education, 2008.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Develop skills on databases to optimize their performance in practice.	L3
2. Analyze each type of databases and its necessity.	L4
3. Design faster algorithms in solving practical database problems	L6
4. Analyze mobile databases and various transaction models.	L4
5. Gain knowledge about multimedia databases and its applications	L1

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307DT-1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A307DT-2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A307DT -3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307DT -4	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
20A307DT -5	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Computational Intelligence
Category PEC
Couse Code 20A307ET

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Computational Intelligence is the successor to Artificial Intelligence
- Offering special benefits in its applications in certain areas like Classification, Regression, Pattern Matching, Control, Robotics, Data Mining etc.
- To introduce the basic tools and techniques in Computational Intelligence such as Neural Networks
- Understands the concepts of Genetic Algorithms from an application perspective to the students.
- Understand the fuzzy logic concepts and build the fuzzy logic systems

Unit 1 Introduction **9**

Background and history of evolutionary computation, Behavioral Motivations for Fuzzy Logic, Myths and Applications areas of Computational Intelligence. Adaption, Self-organization and Evolution, Historical Views of Computational Intelligence, Adaption and Self organization for Computational Intelligence, Ability to Generalize, Computational Intelligence and Soft Computing Vs Artificial Intelligence and Hard Computing.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand history of evolutionary computation, myths and applications areas of Computational Intelligence. (L2)
- Summarize Computational Intelligence and Soft Computing Vs Artificial Intelligence and Hard Computing (L2)

Unit 2 Review of evolutionary computation theory and concepts: **9**

History of Evolutionary Computation, Evolution Computation Overview, Genetic algorithms, Evolutionary programming, Evolution strategies, genetic programming, and particle swarm optimization.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of evolutionary computation. (L2)
- To solve the optimization problems using evolutionary computation algorithms and strategies. (L3)

Unit 3 Review of basic neural network theory and concepts: **9**

Neural Network History, What Neural Networks are and Why they are useful, Neural Networks Components and Terminology, Neural Networks Topology, Neural Network Adaption, Comparing Neural Networks and Other information Processing Methods, Preprocessing and Post Processing.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand basic concepts of neural network theory. (L2)
- Compare Neural Networks and Other information Processing Methods, Preprocessing and Post Processing. (L4)

Unit 4 Fuzzy Systems Concepts and Paradigms: **9**

Fuzzy sets and Fuzzy Logic, Theory of Fuzzy sets, Approximate Reasoning, Fuzzy Systems Implementations, Fuzzy Rule System Implementation.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand Fuzzy Systems Concepts. (L2)
- Build the fuzzy systems and fuzzy rule systems using fuzzy systems paradigms. (L3)

Unit 5 Computational Intelligence Implementations: 9

Implementation Issues, Fuzzy Evolutionary Fuzzy Rule System Implementation, Best tools, Applying Computational Intelligence to Data Mining.

Performance Metrics: General Issues, Percent Correct, Average Sum-squared Error.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the issues in implementation of fuzzy systems. (L2)
- Identify performance metrics like Percent Correct, Average Sum-squared Error. (L3)

Prescribed Text Books:

1. Eberhart & Shi "Computational Intelligence - Concepts to Implementations"

Reference Books:

1. Melanie Mitchell "Introduction to Genetic Algorithms"
2. Davis "Handbook of Genetic Algorithms"
3. Tom Mitchel - Machine Learning

Course Outcomes:

At the end of the course, the student will be able to:	Blooms Level of Learning
1. Provide a basic exposition to the goals and methods of Computational Intelligence.	L1
2. Apply the Intelligent techniques for problem solving.	L2
3. Understand and compare neural networks with other information processing methods.	L2, L4
4. Understand the fuzzy logic concepts and build the fuzzy logic systems.	L2, L3
5. Apply fuzzy logic principles and thinking to deal with vulnerability and tackle real time issues.	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307ET.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307ET.2	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307ET.3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307ET.4	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307ET.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Robotics and Automation
Category PEC
Couse Code 20A307FT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To Acquire basic Knowledge on Robots
- To process end effectors and robotic controls
- To Analyze Robot Transformations and Sensors
- To understand Robot cell design and applications
- To understand micro / Nano Robot cell design

Unit 1 Introduction **9**

Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems Specifications of Robot-Speed of Robot-Robot joints and links-Robot Classifications-Architecture of robotic systems.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the basic concepts of Robotics (L2)
- Describe the Robot classification and architecture of robotic systems (L2)

Unit 2 End Effectors and Robot Controls **9**

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robotControl system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDTMotion Interpolations-Adaptive control.

Learning Outcomes: At the end of the unit, the student will be able to:
- Differentiate the various mechanical grippers (L2)
- Make use of robot controls (L3)

Unit 3 Robot Transformations and Sensors **9**

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand and make use of Robot Transformations (L2, L3)
- Understand and make use of Robot Sensors (L2, L3)

Unit 4 Robot Cell Design and Applications **9**

Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.

Learning Outcomes: At the end of the unit, the student will be able to:
- Model the Robot work cell (L6)
- Use of MATLAB, NXT software for actuators (L3)

Unit 5 Micro/Nano Robotics System 9

Micro/Nanorobotics system overview-Scaling Effect-Top down and bottom-up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic Robot-Swarm robot-Nanorobot in targeted drug delivery system.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the Micro / Nano robotic system (L2)
- Apply the Micro / Nano robot communication techniques (L3)

Prescribed Text Books:

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012

Reference Books:

1. Carl D. Crane and Joseph Duffy, Kinematic Analysis of Robot manipulators, Cambridge University press, 2008.
2. Fu. K. S., Gonzalez. R. C. & Lee C.S.G., "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 1987
3. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley, 1999
4. Ray Asfahl. C., "Robots and Manufacturing Automation", John Wiley & Sons Inc.,1985

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Describes the fundamentals of Robotics and its components	L2
2. Illustrate the movements of Robotic joints with Robot control system	L3
3. Apply end effectors and Robot control in Automation	L3
4. Design robot cell and illustrate the Dynamics of Robotics	L3, L6
5. Apply the Micro / Nano Robotic System in real time issues	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307FT-1	3	-	3	-	3	-	-	-	-	-	-	3	3	3	3
20A307FT -2	3	-	3	-	3	-	-	-	-	-	-	3	3	3	3
20A307FT -3	3	-	3	-	3	-	-	-	-	3	-	3	3	3	3
20A307FT -4	3	-	3	-	3	-	-	-	-	-	-	3	3	3	3
20A307FT -5	3	-	3	-	3	-	-	-	-	3	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Pattern Recognition
Category PEC
Couse Code 20A307GT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Understand the fundamental pattern recognition and machine learning theories
- Able to design and implement certain important pattern recognition techniques
- Capable of applying the pattern recognition theories to applications of interest
- Understand and apply both supervised and unsupervised classification methods.
- Detect and characterize patterns in real-world data.

Unit 1 Introduction to Pattern Recognition **9**

Introduction to Pattern Recognition: Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition,

Pattern Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature, Feature Selection, Evaluation of Classifiers, Evaluation of Clustering

Learning Outcomes: At the end of the unit, the student will be able to:

- Learns different pattern recognition systems. (L2)
- Understands and apply pattern representations. (L2, L3)

Unit 2 **9**

Nearest Neighbour Algorithm, Variants of the NN Algorithm, Use of the Nearest Neighbour Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection,

Bayes Classifier: Bayes Theorem, Minimum error rate classifier, Estimation of Probabilities, Comparison with the NNC, Naive Bayes Classifier, Bayesian Belief Network

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands and design nearest neighbor algorithm. (L2, L6)
- Analyze and implement Bayes classifier pattern recognition techniques. (L4, L6)

Unit 3 **9**

Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification Using HMMs, Classification of Test Patterns.

Decision Trees: Introduction, Decision Trees for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Over fitting and Pruning, Example of Decision Tree Induction.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands and design Hidden Markov models. (L2, L6)
- Analyze and implement Decision trees based pattern recognition techniques. (L4, L6)

Unit 4 **9**

Support Vector Machines: Introduction, Linear Discriminant Functions, Learning the Linear Discriminant Function, Neural Networks, SVM for Classification, Linearly Separable Case, Non-linearly Separable Case.

Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers, Evaluation of Classifiers, Evaluation of Clustering

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands and design Support Vector Machines algorithm. (L2, L6)
- Analyze and implement Ensemble classifier pattern recognition techniques. (L4, L6)

Unit 5 **9**

Clustering: Clustering and its Importance, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets, An Application to Handwritten Digit Recognition: Description of the Digit Data, Pre-processing of Data, Classification Algorithms, Selection of Representative Patterns.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze and implement unsupervised learning methods for pattern recognition techniques. (L4, L6)
- Apply pattern recognition techniques to real-world problems (L3)

Prescribed Text Books:

1. V. Susheela Devi M. NarasimhaMurty, Pattern Recognition an Introduction, University Press.
2. Segrios Theodoridis, Konstantinos Koutroumbas Pattern Recognition, Fourth Edition, Elsevier

Reference Books:

1. Earl Gose, Richard John Baugh, Steve Jost , Pattern Recognition and Image Analysis, PHI 2004
2. C. M. Bishop, 'Neural Networks for Pattern Recognition', Oxford University Press, Indian Edition, 2003
3. R.O.Duda, P.E.Hart and D.G.Stork, Johy, Pattern Classification, Wiley, 2002

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the fundamental pattern recognition and machine learning theories	L2
2. Implement different pattern classifiers	L5
3. Identify the strengths and weaknesses of different pattern classification techniques	L4
4. Apply pattern recognition techniques to real-world problems	L3
5. Understand and apply both supervised and unsupervised classification methods.	L2, L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307GT.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	-
20A307GT.2	3	3	3	-	-	-	-	-	-	-	-	3	-	3	3
20A307GT.3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A307GT.4	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307GT.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Linux Programming
Category PEC
Couse Code 20A307HT

Year IV B. Tech.
Semester I Semester
Branch CSE & AI&DS

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able to

- Understand and make effective use of Linux utilities and shell scripting language to solve problems.
- Learn the implementation in C some standard Linux utilities like mv, cp, ls etc…
- Develop the skills the necessary for systems programming including file system programming, process and signal management.
- Develop the skills inter-process communication, message queues and semaphores.
- Develop the basic skills required to write network programs using sockets and shared memory.

Unit 1: **10**

Linux Utilities: File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text Processing utilities and backup utilities.

Learning Outcomes: At the end of the unit, the student will be able to:

- Define the importance Linux (L1)
- Understand basics operations on Linux operating system (L2)

Unit 2: **10**

Files: File Concept, File types, File system Structure, File meta data – Inodes, Kernel support for files, System calls for I/O operations – open, create, read, write, lseek, dup2. File status information – stat family, file and record locking, fcntl function, Links – Soft links & hard links – symlink, link, unlink.

Directories: creating, removing, changing directories – mkdir, rmdir, chdir, obtaining current working directory – getcwd, directory contents, scanning directories – opendir, readdir, closedir, rewinddir functions

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify various file types and file system structure (L2)
- Create file systems and directories and operate them (L6)

Unit 3: **9**

Process: Process concepts, layout of C program image in main memory, process environment –environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control-process creation. Replacing a process image, Waiting for a process, process termination, zombie process, orphan process, system call interface form process management – fork, vfork, exit, wait, waitpid, exec family, process groups, session and controlling terminal, difference between threads and processes.Signal-Introduction to signals, Signal generation and handling, Kernel support for signal, Signal function, unreliable signals, reliable signals, Kill, raise, alarm, pause, abort, sleep functions.

Learning Outcomes: At the end of the unit, the student will be able to:

- Recollect the importance of process (L2)
- Apply processes background and fore ground etc.. by fork() system calls (L3)

Unit 4: **9**

Inter Process Communications: Introduction to IPC, IPC between processes on a single computer, IPC between processes on different systems, pipes – creating, IPC between related processes using Unnamed Pipes, FIFOs – creation, IPC between unrelated processes using FIFO (named pipes), difference between named and unnamed pipes, popen and pclose library functions.

Message Queues – kernel support for messages, APIs for Message Queues, client/server examples.
Semaphores – Kernel support for semaphores, APIs for semaphores, FILE locking with semaphores.
Learning Outcomes: At the end of the unit, the student will be able to:

- Remember the concept of Inter Process Communications (L1)
- Infer the concept of message queues and can exercise on semaphores (L2)

Unit 5: **9**

Shared Memory: Kernel support for Shared memory, APIs for shared memory, shared memory examples.
Sockets: Introduction to Berkeley Sockets, IPC over a network, client/server model, Sockets Address Structure (UNIX Domain & Internet Domain), Socket System calls for connection oriented Protocol and connectionless protocol, Example client/server programs – single server-client connection, multiple simultaneous clients, socket options – setsockopt and fcntl system calls, comparison of IPC mechanisms.
Learning Outcomes: At the end of the unit, the student will be able to:

- Summarize shared memory concepts
- Analyze shared memory segments, pipes and network socket programming implementation (L4)

Prescribed Text Books:

1. Unix System Programming using C++, T. Chan, PHI.
2. Unix concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Linux System Programming. Robert Love, O'Reilly, SPD.
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Willey India Edition.

Reference Text books:

1. Unix Network Programming, W.R.Stevens, PHI.
2. Unix and Shell Programming, B.A. Forouzan & R.F. Gilberg, Cengage Learning

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the basic commands of Linux operating system and can write shell scripts	L2
2. Create file systems and directories and operate them	L6
3. Apply processes background and fore ground etc.. by fork() system calls	L3
4. Infer the concept of message queues and can exercise inter-process communication	L2
5. Analyze shared memory segments, pipes and network socket programming implementation.	L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307HT-1	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3
20A307HT-2	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3
20A307HT-3	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3
20A307HT-4	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3
20A307HT-5	3	3	3	3	-	-	-	-	-	-	3	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Blockchain Technology
Category PEC
Couse Code 20A57FT

Year IV B. Tech
Semester I Semester
Branch CSE & AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: Students will be able to

- Understand how Blockchain systems (mainly Bitcoin and Ethereum) work.
- Learn how to interact with the system securely.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from Blockchain technology into their own projects.

Unit 1 Basics **9**

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.
Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero, and Knowledge Proof.
Learning Outcomes: At the end of the unit, the student will be able to

- Understand the distributed systems(L2)
- Use the various cryptography techniques(L3)

Unit 2 Blockchain **9**

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.
Learning Outcomes: At the end of the unit, the student will be able to:

- Demonstrate the importance of Blockchain in real world (L3)
- Understand the applications of Blockchain(L2)

Unit 3 Distributed Consensus **9**

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.
Learning Outcomes: At the end of the unit, the student will be able to:

- Understand Nakamoto consensus (L2)
- Operate the network based on Energy utilization (L3)

Unit 4 Cryptocurrency **9**

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin
Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the importance of Bitcoin protocols (L2)
- Illustrate the principles of Ethereum (L4)

Unit 5 Cryptocurrency Regulation **9**

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.
Applications*:* Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.
Learning Outcomes: At the end of the unit, the student will be able to:

- Summarize the importance of Crypto-Currency in Global economy (L5)
- Understand the importance of IoT & DNS (L2)

Prescribed Text Book:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the distributed systems and various cryptography techniques	L2
2. Demonstrate the importance of Blockchain & its applications in real world	L3
3. Understand Nakamoto consensus & Operate the network based on Energy utilization	L2, L3
4. Identify the importance of Bitcoin protocols & Ethereum	L2
5. Summarize the importance of Crypto-Currency in Global economy	L5

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A57FT -1	3	3	3	3	2	3	-	3	3	-	-	3	3	2	3
20A57FT -2	3	3	3	2	3	3	-	3	3	-	-	3	3	3	3
20A57FT -3	3	3	3	3	3	2	3	-	3	-	-	3	3	3	2
20A57FT-4	3	3	3	3	3	2	2	2	3	-	-	3	2	3	3
20A57FT-5	3	3	3	3	3	2	3	3	3	3	-	3	2	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Reinforcement Learning
Category PEC
Couse Code 20A307JT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- Learn how to define RL tasks and the core principals behind the RL, including policies, value functions.
- Understand and work with tabular methods to solve classical control problems.
- Recognize current, advanced techniques and applications in RL.
- Understand reinforcement learning framework and discover how to define intelligent agents and logic agents to solve real-world problems
- Apply deep reinforcement learning techniques to solve decision problems.

Unit 1 Reinforcement Learning Primitives **9**

Introduction and Basics of RL, Defining RL Framework, Probability Basics: Probability Axioms, Random Variables, Probability Mass Function, Probability Density Function, Cumulative Distribution Function and Expectation. Introduction to Agents, Intelligent Agents – Problem Solving – Searching, Logical Agents.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the framework and core principle of Reinforcement Learning. (L2)
- Solve the real time problems using intelligent agents and logic agents. (L3)

Unit 2 Markov Decision Process and Dynamic Programming **9**

Markov Property, Markov Chains, Markov Reward Process (MRP), Bellman Equations for MRP,

Dynamic Programming: Polices (Evaluation, Improvement, Iteration, Value Iteration), Asynchronous Dynamic Programming, Generalized Policy Iteration, Efficiency of Dynamic Programming.

Learning Outcomes: At the end of the unit, the student will be able to:

- Learn how to define Markov Decision Processes to solve real-world problems. (L1)
- Write their own implementations of iterative policy evaluation, policy improvement, policy iteration, and value iteration. (L2)

Unit 3 Monte Carlo Methods and Temporal Difference Learning **9**

Monte Carlo: Prediction, Estimation of Action Values, Control and Control without Exploring Starts, Off-Policy Control, Temporal Difference Prediction:TD(0), SARSA: On-Policy TD control, Q-Learning: Off-Policy TD control, Games, Afterstates, and Other Special Cases.

Learning Outcomes: At the end of the unit, the student will be able to:

- Develop classic Monte Carlo prediction and control methods. (L3)
- Outline the difference between the Sarsa, Q-Learning, and Expected Sarsa algorithms. (L2)

Unit 4 Deep Reinforcement Learning **9**

Deep Q-Networks, Double Deep-Q Networks(DQN, DDQN, Dueling DQN, Prioritized Experience Replay).

Learning Outcomes: At the end of the unit, the student will be able to:

- Develop value-based reinforcement learning methods to complex problems using deep neural networks. (L3)
- Demonstrate how to implement a Deep Q-Network (DQN), along with Double-DQN, Dueling-DQN, and Prioritized Replay. (L2)

Unit 5 Policy Optimization in Reinforcement Learning 9

Introduction to Policy-based Methods, Vanilla Policy Gradient, REINFORCE Algorithm and Stochastic Policy Search, Asynchronous Actor-Critic and Asynchronous Advantage Actor-Critic (A2C, A3C), Advanced Policy Gradient (PPO, TRPO, DDPG).

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the theory behind evolutionary algorithms, stochastic policy search, and the REINFORCE algorithm. (L2)
- Explore policy optimization methods such as Trust Region Policy Optimization (TRPO) and Proximal Policy Optimization (PPO). (L4)

Prescribed Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An Introduction", Second Edition, MIT Press, 2019.
2. Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach.", Pearson Education Limited, 2016.

Reference Books:

1. Ian Goodfellow, YoshuaBengio, and Aaron Courville. "Deep learning." MIT press, 2017.
2. Marco Wiering, Martijn van Otterlo(Ed),"Reinforcement Learning, State-of-the-Art, Adaptation, Learning, and Optimization book series, ALO, volume 12, Springer, 2012.
3. Keng, Wah Loon, Graesser, Laura, "Foundations of Deep Reinforcement Learning: Theory and Practice in Python", Addison Wesley Data & Analytics Series, 2020.

Course Outcomes:

At the end of the course, the student will be able to:	Blooms Level of Learning
1. Understand reinforcement learning framework and discover how to define intelligent agents and logic agents to solve real-world problems.	L2, L3
2. Apply Markov Decision Processes and dynamic programming to solve real-world problems.	L3
3. Model the Monte Carlo Methods and Temporal Difference Learning policies.	L3
4. Apply deep reinforcement learning techniques to solve decision problems.	L3
5. Explore evolutionary algorithms, Reinforce algorithm policy optimization methods.	L4

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307JT.1	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A307JT.2	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
20A307JT.3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307JT.4	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307JT.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Cyber Security and Forensic Science
Category PEC
Couse Code 20A307KT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To Remember Network Security architecture principles
- To Understand about cybercrime and cybercrime issues
- To Compare different classes of attacks
- To Understand about digital forensics
- To Apply tools and methods used in forensic science

Unit 1 Network Security 10

Cryptographic Techniques: Security attacks, services, and mechanisms, Fundamental security design principles.

Cyber Symmetric key Cryptographic Techniques: Introduction to Stream cipher, Block cipher, DES,AES, IDEA

Asymmetric key Cryptographic Techniques: principles, RSA, Elliptic Curve cryptography, Key distribution and Key exchange protocols

Learning Outcomes: At the end of the unit, the student will be able to:

- Understands the basic concepts in cryptography (L2)
- Gain the knowledge about use of cryptography for data and network security (L3)

Unit 2 Cyber Crime & Issues 12

Cyber Crime: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crimes- Crime against an individual, Crime against property, Cyber extortion, Drug trafficking, cyber terrorism.

Cyber Crime Issues: Unauthorized Access to Computers, Computer Intrusions, Viruses, and Malicious Code, Internet Hacking and Cracking, Virus and worms, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Password Cracking, Steganography, Key loggers and Spyware, Trojan and backdoors, phishing, DOS and DDOS attack, SQL injection, Buffer Overflow.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the nature and scope of Cyber Crimes (L2)
- Discuss the issues related to Cyber Crimes. (L2)

Unit 3 Cyber Attacks 8

Cyber-attacks: Passive attacks, Active attacks, Cybercrime prevention methods, Application security (Database, E-mail, and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control, Hardware protection mechanisms, OS Security.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand various Cyber-attacks (L2)
- Illustrate the Cyber Crime prevention policies (L4)

Unit 4 Digital Forensics 8

Digital Forensics: Introduction to Digital Forensics, Historical background of digital forensics, Forensic software and hardware, need for computer forensics science, special tools and techniques digital forensic life cycle, challenges in digital forensic.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic of Digital forensics (L2)
- Explain how to conduct a digital forensics investigation (L2)

Unit 5 Computer, Network & Mobile Forensics 10

Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation and complete a case, Critique a case.

Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

Mobile Forensics: mobile forensics techniques, mobile forensics tools.

Learning Outcomes: At the end of the unit, the student will be able to:

- Analyze the investigation and complete a case in computer forensics (L4)
- Make use of Network and Mobile forensics Techniques (L3)

Prescribed Text Books:

1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi.
2. William Stallings, Cryptography and Network Security, Pearson Education ,4th edition.

Reference Books:

1. Robert M Slade," Software Forensics", Tata McGraw – Hill, New Delhi,
2. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt

Course Outcomes:

At the end of the course, the student will be able to:	Blooms Level of Learning
1. Remember Network Security architecture principles	L1
2. Understand about cybercrime and cybercrime issues	L2
3. Compare different classes of attacks	L2
4. Understand about digital forensics	L3
5. Apply tools and methods used in forensic science	L2

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307KT.1	3	-	-	-	-	-	-	-	-	-	-	3	3	3	3
20A307KT.2	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307KT.3	3	-	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307KT.4	3	-	3	3	3	-	-	-	-	-	-	3	3	3	3
20A307KT.5	3	-	3	3	3	-	-	-	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Bio-inspired Computing
Category PEC
Couse Code 20A307LT

Year IV B. Tech.
Semester I Semester
Branch AI & DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
- To learn bio-inspired algorithms, random walk and simulated annealing
- To learn genetic algorithm and differential evolution
- To learn swarm optimization and ant colony for feature selection
- To understand bio-inspired application in image processing

Unit 1 Bio-Inspired Computing Fundamentals 9

Introduction to Computing - Algorithm - Newton's method – Optimization algorithm - No-Free-Lunch Theorems - Nature-Inspired Meta-heuristics - Analysis of Algorithms -Nature Inspired Algorithms -Parameter tuning - parameter control- Example of Bio-inspired computing.

Learning Outcomes: At the end of the unit, the student will be able to:
- Implement and apply bio-inspired algorithms (L1, L3)
- Understand the fundamentals of Bio-inspired Computing (L2)

Unit 2 Random Walk and Annealing 9

Random variables - Isotropic random walks - Levy distribution and flights - Markov chains - Step sizes and search efficiency - Modality and intermittent search strategy - Importance of randomization- Eagle Strategy-Annealing and Boltzmann Distribution - parameters -SA algorithm - Stochastic Tunneling.

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain random walk and simulated annealing (L4)
- Understand the importance of randomization (L2)

Unit 3 Genetic Algorithms 9

Introduction to Genetic algorithms and - Role of genetic operators - Choice of parameters - GA variants - Schema theorem - Convergence analysis - Introduction to differential evolution - Variants - Choice of parameters Convergence analysis - Implementation.

Learning Outcomes: At the end of the unit, the student will be able to:
- Implement and apply genetic algorithms (L1, L3)
- Understand the role of genetic operators (L2)

Unit 4 Swarm Optimization and Firefly Algorithm 9

Biological self-organization - Swarm intelligence - PSO algorithm – Accelerated PSO - Implementation - Convergence analysis - Binary PSO - The Firefly algorithm - Algorithm analysis - Implementation - variants- Ant colony optimization toward feature selection-Swarm robotics– Artificial evolution of competing systems.

Learning Outcomes: At the end of the unit, the student will be able to:
- Explain swarm intelligence and ant colony for feature selection (L4)
- Apply Ant colony optimization toward feature selection (L3)

Unit 5 Application In Image Processing 9

Bio-Inspired Computation and its Applications in Image Processing: An Overview - Fine-Tuning Enhanced Probabilistic Neural Networks Using Metaheuristic- driven Optimization - Fine-Tuning Deep Belief Networks using Cuckoo Search - Improved Weighted Thresholded Histogram

Equalization Algorithm: Digital Image Contrast Enhancement Using Bat Algorithm - Ground Glass Opacity Nodules Detection and Segmentation using Snake Model - Mobile Object Tracking Using Cuckoo Search.

Learning Outcomes: At the end of the unit, the student will be able to

- Apply bio-inspired techniques in image processing (L3)
- Understand the use of Equalization Algorithm (L2)

Prescribed Text Books:

1. Eiben, A.E., Smith,James E, "Introduction to Evolutionary Computing", Springer 2015.
2. Helio J.C. Barbosa, "Ant Colony Optimization - Techniques and Applications", Intech 2013.
3. Xin-She Yang, Jaao Paulo papa, "Bio-Inspired Computing and Applications in Image Processing", Elsevier 2016.

Reference Books:

1. Xin-She Yang, "Nature Inspired Optimization Algorithm,Elsevier First Edition 2014.
2. D. E. Goldberg, “Genetic algorithms in search, optimization, and machine learning”, Addison- Wesley, 1989
3. Yang, Cui,Xiao, Gandomi, Karamanoglu, “Swarm Intelligence and Bio-Inspired Computing", Elsevier First Edition 2013.
4. R. C. Ebelhart et al., “Swarm Intelligence”, Morgan Kaufmann, 2001

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Implement and apply bio-inspired algorithms	L1, L3
2. Explain random walk and simulated annealing	L4
3. Implement and apply genetic algorithms	L1, L3
4. Explain swarm intelligence and ant colony for feature selection	L4
5. Apply bio-inspired techniques in image processing.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307LT.1	3	3	3	3	3	1	1	1	2	2	2	2	3	3	-
20A307LT.2	3	3	3	3	3	1	1	1	1	-	-	1	2	2	-
20A307LT.3	3	3	3	3	3	1	1	1	3	2	2	3	3	3	-
20A307LT.4	3	3	3	3	3	1	1	1	1	-	-	1	2	2	-
20A307LT.5	3	3	3	3	3	1	1	1	3	2	2	3	3	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Social Media Analytics
Category OEC
Couse Code 20A307MT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives:

- To gain knowledge about social networks, its structure and their data sources.
- To study about the knowledge representation technologies for social network analysis.
- To analyze the data left behind in social networks.
- To gain knowledge about the community maintained social media resources.
- To learn about the visualization of social networks.

Unit 1 Introduction to Semantic Web 9

The development of Semantic Web – Emergence of the Social Web – The Development of Social Network Analysis – Basic Graph Theoretical Concepts of Social Network Analysis – Electronic Sources for Network Analysis – Electronic Discussion Networks, Blogs and Online Communities, Web-based Networks

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and apply key concepts in semantic web (L2, L3)
- Analyze the social media data using native analytics (L4)

Unit 2 Knowledge Representation on The Semantic Web 9

Ontology-based knowledge Representation – Ontology languages for the Semantic Web: RDF and OWL– Modeling Social Network Data – Network Data Representation, Ontological Representation of Social Individuals and Relationships –Aggregating and Reasoning with Social Network Data

Learning Outcomes: At the end of the unit, the student will be able to:

- Make use of process the collected data (L3)
- Understand the common ontology design patterns (L2)

Unit 3 Social network mining 9

Detecting Communities in Social Network – Evaluating Communities –Methods for Community Detection – Applications of Community Mining Algorithms – Tools for detecting communities – Application: Mining Facebook - Exploring Facebook's social Graph API – Analyzing social graph connections.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply the community mining algorithms (L3)
- Explore social media data like facebook (L4)

Unit 4 Community Maintained Social Media Resources 9

Community Maintained Resources – Supporting technologies for community-maintained resources– User Motivations-Location based social interaction – location technology– mobile location sharing – Social Information Sharing and social filtering – Automated recommender system.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the supporting technologies for community-maintained protocol (L2)
- Make use of location based social interaction (L3)

Unit 5 Visualization of Social Networks **9**

Visualization of Social Networks - Node-Edge Diagrams – Random Layout – Force-Directed Layout – Tree Layout – Matrix Representations –Matrix and Node-Link Diagrams – Hybrid Representations – Visualizing Online Social Networks.

Learning Outcomes: At the end of the unit, the student will be able to:

- Develop social media measurements plans and analytics reports (L6)
- Makes better business decisions by leveraging social media (L3)

Prescribed Text Books:

1. Matthew A. Russell,"Mining the Social Web: Data Mining Facebook, Twitter, LinkedIn, Google+, Githuband more", O'REILLY, Third Edition, 2018.
2. CharuAggarwal, "Social Network Data Analytics," Springer, First Edition, 2014

Reference Books:

1. Jennifer Golbeck, "Analyzing the social web", Waltham, MA: Morgan Kaufmann (Elsevier), First Edition, 2013
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", Springer, First Edition, 2010
3. Peter Mika, "Social Networks and the Semantic Web", Springer, First Edition, 2007
4. Stanley Wasserman and Katherine Faust, "Social network analysis: methods and applications", Cambridge University Press, First Edition, 1999

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the basic principles behind network analysis algorithms	L2
2. Model and represent knowledge for social semantic Web	L6
3. Use extraction and mining tools for analyzing Social networks	L3
4. Discuss about community maintained social media resources	L2
5. Develop personalized visualization for Social networks	L6

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307MT-1	3	-	-	-	-	-	-	-	-	-	-	-	3	3	3
20A307MT-2	3	3	-	3	-	-	-	-	-	-	-	-	3	3	3
20A307MT-3	3	3	-	3	-	-	-	-	-	-	-	-	3	3	3
20A307MT-4	3	-	3	-	-	-	-	-	-	3	-	-	3	3	3
20A307MT-5	3	3	3	3	1	1	-	-	-	3	-	1	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Image and Video Analytics
Category OEC
Couse Code 20A307NT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives:

- To identifies the concepts, models and methods in the field of computer vision.
- To describe the CNN models and image classifications.
- To determine the faces using object detection.
- To analyze approaches for action representation and recognition.
- To assess the performance of image processing system.

Unit 1 Computer Vision 9

Introduction – Digital Images – Structure of Human Eye and Vision – Color Models- Image processing goals and tasks – Contrast and brightness correction – Image Convolution – Edge Detection.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe known principles of human visual system (L2)
- Describe the methods of computer vision related to Edge detection (L2)

Unit 2 Understanding Convolutions and Image Classification 9

Understanding Convolutions: CNN Model Parameters – Working with pooling layers – Implementing CNNs with Tensorflow

Image classification: AlexNet, VGG and Inception architectures – ResNet- Fine-grained Image recognition – Detection and Classification of facial attributes –- Content-based image retrieval – Computing semantic image embeddings using CNN – Employing indexing structures for efficient retrieval of semantic neighbors – Face verification – Facial key points regression – convolution features for visual recognition.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand convolutions model (L2)
- Understand image classification and analysis problem (L2, L3)

Unit 3 Object Detection 9

Introduction – Sliding windows – HOG-based detector – Detector training – Viola-Jones Face detector – Attentional Cascades and Neural – Region-Based Convolutional Neural – From R-CNN to Fast R – Faster R-CNN – Region-Based Fully-Convolutional Network – Single Shot detector.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify and detect the object using Region based CNN (L2)
- Understand the Region based CNN (L2)

Unit 4 Object Tracking and Action Recognition 9

Introduction to Video Analysis – Optical flow –- Deep learning in optical flow estimation – Visual object tracking – Multiple object tracking – Action Recognition – Action classification – Action localization.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the approaches for identifying and tracking objects (L2)
- Identify the approaches for action recognition (L2)

Unit 5 Image Segmentation and Synthesis 9

Image segmentation – Deep learning models for image segmentation – Human pose estimation as image segmentation – Style transfer – Generative adversarial networks – Image transformation with neural networks – Image segmentation and synthesis.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply the concept of image segmentation. (L3)
- Evaluate the methodologies for image segmentation and synthesis (L5)

Prescribed Text Books:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image processing", Pearson International Edition, Fourth Edition, 2018.
2. Rajalingappaa Shanmugamani, "Deep Learning for Computer Vision", O'REILLY, 2018.

Reference Books:

1. Debjyoti Paul and Charan Puvvala, "Video Analytics using Deep Learning: Building Applications with Tensorflow, Keras and YOLO", Apress, First Edition, 2020.
2. Deep Learning into Computer Vision : https://www.coursera.org/learn/deep-learning-incomputer-vision

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the purpose of computer vision and operations that can be applied to them	L2
2. Build key point detector using CNN	L6
3. Detect an object like face using Deep CNN	L4
4. Design computer vision architectures for video analysis	L4
5. Predict entire image using image segmentation and synthesis	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307NT.1	3	3	-	-	3	-	-	-	-	-	-	-	3	3	3
20A307NT.2	3	3	-	-	3	-	-	-	-	2	-	-	3	3	3
20A307NT.3	3	3	-	-	3	-	-	-	3	-	-	-	3	3	3
20A307NT.4	3	3	-	-	3	-	-	-	3	-	-	-	3	3	3
20A307NT.5	3	3	2	-	3	-	-	-	3	-	-	-	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Software Defined Networks
Category OEC
Couse Code 20A307OT

Year IV B.Tech
Semester I Semester
Branch AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives:

- To understand the concepts of software defined networks
- To learn the interface between networking devices and the software controlling them
- To know about SDN in data centers
- To explore modern approaches like openflow, openstack
- To Apply the knowledge on SDN and security measures to solve real world problems

Unit 1 SDN Introduction 9

Basic packet-Switching terminology - Historical background - The modern Data Center - Traditional switch architecture - Autonomous and dynamic forwarding Tables- Open source and technological shifts.- Evolution of switches and Control plane – Cost- SDN Implications for research and innovation- Data Center Innovation- Data Center needs -The evolution of networking technology - Forerunners of SDN- Sustaining SDN interoperability - Open Source contributions- Legacy mechanisms evolve towards SDN- Network virtualization.

Learning Outcomes: At the end of the unit, the student will be able to

- Describes the key benefits of SDN (L2)
- Explain the network virtualization (L2)

Unit 2 SDN and open flow specification 9

Fundamental characteristics of SDN - SDN operation - SDN Devices- SDN Controller - SDN applications- Alternate SDN methods - OpenFlow Overview - OpenFlow 1.0 and OpenFlow basics- OpenFlow 1.1 additions - OpenFlow 1.2 additions - OpenFlow 1.3 additions - OpenFlow limitations.

Learning Outcomes: At the end of the unit, the student will be able to

- Interpret the SDN operation protocols (L2)
- Understand the fundamental operations of SDN (L2)

Unit 3 SDN in Data Centers and other Environment 9

Data Center definition - Data Center demands- Tunneling technologies for the Data Center- Path technologies in the Data Center - Ethernet fabrics in the Data Center- SDN Use Cases in the Data Center- Open SDN vs Overlays in the Data Center- Real World Data Center implementations- SDN in other environments - Wide Area Networks - Service provider and carrier networks - Campus networks- Hospitality networks- Mobile network - In-Line network functions- Optical Networks - SDN vs P2P/Overlay Networks.

Learning Outcomes: At the end of the unit, the student will be able to

- Analyze the data center topologies and virtualized environment (L4)
- Differentiate between SDN Vs P2P/ Overlay networks (L4)

Unit 4 SDN Applications and Open Source Perspectives 9

Reactive versus proactive applications - Analyzing simple SDN Applications- A simple reactive Java application - Background on controllers - Using the Floodlight controller - Using the Open Daylight controller - Using the Cisco XNC Controller - Switch considerations- Creating network virtualization tunnels - Offloading flows in the Data Center- Access control for the campus- Traffic engineering for service providers - Open source licensing issues - Profiles of SDN Open Source users- OpenFlow source code- Switch implementations - Controller implementations - SDN applications - Orchestration and network virtualization - Simulation and testing - Tools- OpenStack.

Learning Outcomes: At the end of the unit, the student will be able to

- Differentiate the reactive and proactive applications (L4)
- Describe the network functions virtualization components and the role in SDN (L2)

Unit 5 SDN Security Challenges 9

Characteristics of SDN - Security analysis and potential attacks in SDN - Solutions to the security issues in SDN - Network security enhancement using the SDN Framework - Issues and Challenges.

Learning Outcomes: At the end of the unit, the student will be able to

- Examine the challenges and issues associated with SDN (L4)
- Make use of solutions to the security issues in SDN (L3)

Prescribed Text Books:

1. Paul Goransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann Publications, First Edition , 2014.
2. S. Scott-Hayward, S. Natarajan and S. Sezer, "A Survey of Security in Software Defined Networks," in IEEE Communications Surveys & Tutorials, vol. 18, no. 1, pp. 623-654, First quarter 2016.

Reference Books:

1. Thomas D. Nadeau and Ken Gray, "SDN - Software Defined Networks" O'Reilly Media , 2013.
2. Siamak Azodolmolky, "Software Defined Networking with OpenFlow", Packt Publishing, 2013
3. Feamster, Nick, Jennifer Rexford, and Ellen Zegura, "The road to SDN: an intellectual history of programmable networks." ACM SIGCOMM Computer Communication Review , Volume 44, Number 2, 2014, Pages 87-98.
4. Kreutz, Diego, et al. "Software-defined networking: A comprehensive survey." Proceedings of the IEEE 103.1 (2015): 14-76.
5. Nunes, Bruno AA, et al. "A survey of software-defined networking: Past, present, and future of programmable networks." Communications Surveys & Tutorials, IEEE 16.3 (2014): 1617-1634.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Differentiate between traditional networks and software defined networks.	L2
2. Understand advanced and emerging networking technologies.	L2
3. Learn how to use SDN controllers to perform complex networking tasks.	L1
4. Demonstrate the skills to do advanced networking research and programming.	L3
5. Apply the knowledge on SDN and security measures to solve real world problems	L3

COs-POs-PSOs Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A307OT.1	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
20A307OT.2	3	3	3	3	-	-	3	-	-	-	-	3	3	3	3
20A307OT.3	3	3	3	3	3	-	-	-	-	-	-	3	3	3	3
20A307OT.4	3	3	3	3	3	3	3	-	-	-	-	3	3	3	3
20A307OT.5	3	3	3	3	3	3	3	1	-	-	-	3	3	3	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Cloud Computing
Category OEC
Couse Code 20A57GT

Year IV B. Tech.
Semester I Semester
Branch CSE & AI&DS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	2	3

Course Objectives: This course will be able to

- Learn the new computing model this enables shared resources on demand over the Network.
- Understand about the pay-per-use scenarios.
- Apply the new kind of service models and deployment models.
- Analyze the virtualization technology and to improve cloud Storage systems.
- Develop Cloud security and cloud application model.

Unit 1 **9**

Introduction: Network centric computing and network centric content, Peer-to-peer systems, VCloud Computing: an old idea whose time has come, Cloud Computing delivery models & Services, Ethical issues, Cloud vulnerabilities, Challenges

Cloud Infrastructure: Amazon, Google, Azure & online services, open source private clouds. Storage diversity and vendor lock-in, intercloud, Energy use & ecological impact of data centers, service level and compliance level agreement, Responsibility sharing, user experience, Software licensing.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the background of cloud computing models and services (L2)
- Know the different cloud infrastructures in detail with examples (L2)

Unit 2 **9**

Cloud Computing: Applications & Paradigms, Challenges, existing and new application opportunities, Architectural styles of cloud applications, Workflows coordination of multiple activities, Coordination based on a state machine model -the Zoo Keeper, The Map Reduce programming model, Apache Hadoop.

Applications: Healthcare, Energy systems, transportation, manufacturing, Education, Government, mobile communication, application development.

Learning Outcomes: At the end of the unit, the student will be able to:

- Illustrate the architectural styles of cloud applications (L4)
- Explain different methodologies and technologies for the development of applications that will be deployed and offered through cloud computing environments. (L2)

Unit 3 **9**

Cloud Resource Virtualization: Definition, merits and demerits, types & Techniques, Layering, Virtual machine monitors, Hardware support for virtualization Case study: Xen -aVMM based on paravirtualization, Optimization of network virtualization in Xen 2.0, vBlades-paravirtualization targeting a x86-64 Itanium processor, A performance comparison of virtual machines, The darker side of virtualization, Software fault isolation.

Learning Outcomes: At the end of the unit, the student will be able to:

- Use the different types and techniques of cloud resource virtualization (L3)
- Discuss the virtualization technology and outline its role in enabling cloud computing (L2)

Unit 4 **9**

Cloud Resource Management: Policies and mechanisms for resource management, Stability of a two level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers,

Storage systems: Evolution, Storage models, file systems, databases, General parallel File system, GFS, Hadoop, Locks & Chubby, TPS, NOSQL, BigTable.

Learning Outcomes: At the end of the unit, the student will be able to:

- Demonstrate the high-level use of cloud resource management (L3)
- Compare different cloud based storage models (L4)

Unit 5 **9**

Cloud Security: Risks, Security, privacy, Trust. Security of OS, VM, VMM, shared image, management OS.

Cloud Application Development: Amazon Web services, EC2 Instances, connecting clouds, Security rules, Launch and EC2 Linux instances.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the core issues of cloud security, privacy and interoperability (L2)
- Implement different cloud based applications through online (L3)

Prescribed Text Books:

1. Cloud Computing Theory and Practice – DAN C. Marinescu – ELSEVIER
2. Cloud Computing: A hands on Approach Bagha Madisetti

Reference Text Books:

1. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, Geoffrey Fox. MK Publishers.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw Fill, 2010

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand cloud computing and shared resources over the internet.	L1
2. Illustrate different cloud applications in cloud platforms.	L2
3. Make use of virtual machines and optimization of virtualization.	L3
4. Analyze cloud resources and to choose storage system for computing clouds.	L2
5. Examine Cloud security, and risks involved in developing cloud application.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A57GT.1	3	3	3	--	3	-	-	-	3	3	3	3	3	-	3
20A57GT.2	3		3	-	-	-	3	-	-	-	3	-	3	-	3
20A57GT.3	3	3	3	-	3	3	3	-	3	-	-	3	3	-	3
20A57GT.4	3	-	-	-	3	-	3	-	3	3	3	-	3	-	3
20A57GT.5	3	3	3	-	-	3	-	-	2	-	-	3	3	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Water Resources and Harvesting
Category OEC
Couse Code 20A17RT

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To familiarize students about the occupational hazards and remedial measures to say safe at work place.
- To enable students to learn the basics of the environmental management in order to make them job ready.

Unit 1 Water and wastewater 9

Introduction – Water resources (Surface and subsurface) and its significance – Water: distribution on earth, Water quality and standards; Water pollution: Types, sources and impacts – Surface water, ground water pollution, Wastewater: Domestic – black and grey water; industrial and agricultural wastewater. Waste water treatment – Methods.

Learning Outcomes: At the end of the unit, the student will be able to learn

- Know the significance of surface and sub-surface water resources.
- Know the impact of waste water on domestic, agricultural and industrial.

Unit 2 Water Resource Management 10

Hydrological cycle, Precipitation Evaporation and condensation, Groundwater - Classification, Aquifers – types and management. Soil conservation and water recharge. Ground water management and key factors.

Learning Outcomes: At the end of the unit, the student will be able to

- Learn the elements in hydrological cycle
- Recharge and preserve subsurface water.

Unit 3 Rainwater Harvesting 10

Conservation and Harvesting of rain. Types and design of water harvesting structures; catchments – type and methods. Rainwater harvesting-Catchment and roof top harvesting, Check dams, Artificial recharge, Farm ponds, Percolation tanks, traditional rain water harvesting structures

Learning Outcomes: At the end of the unit, the student will be able to

- Know the difficulties in design of water harvesting structures.
- Know the rain water harvesting techniques.

Unit 4 Watershed Management 8

Definition, watershed delineation; watershed development: concepts, objectives and need- Integrated and multidisciplinary approach for watershed management- Characteristics of watershed: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology- Socio-economic characteristics.

Learning Outcomes: At the end of the unit, the student will be able to

- Know Multidisciplinary approaches and characteristics for water shed managements.
- Know the hydrology, hydrogeology and socio economic characteristics.

Unit 5 Basin Management 12

Definition, Factors affecting basin management- Preparation of land drainage schemes-Types and design of surface drainage -Controlling of soil erosion and soil characteristics; Estimation of soil loss due to erosion. Water availability assessment – Surface water and groundwater-Water demand assessment: municipal, industrial, agricultural and environmental-Water allocation - Principles and policies, State and National water conflicts and management.

Learning Outcomes: At the end of the unit, the student will be able to

- Know the schemes of various drainage systems
- Assess the availability of water and water demand.

Prescribed Text Books:

1. Irrigation and Water Resources Engineering- G.L. Asawa, New age international Publisher
2. Watershed management and Field manuals -FAO
3. Watershed management in India, J.V.S. Moorthy, Wiley India.
4. Hydrology & Water Resources Engg., S K Garg, Khanna Pub., Delhi.

Reference Books:

1. Hydraulics &Fluid Dynamics-P.M.Modi and S.M.Seth,Standard book house, Delhi
2. Applied Hydrology - Chow V T., McGraw-Hill, Inc
3. Irrigation, Water Resources & Water Power Engg., P N Modi, New Age Publishers.

Course Outcomes:

At the end of the course, the student will be able to		Blooms Level of Learning
1.	Know about various sustainable materials	L4
2.	Understand the concept of sustainable buildings	L3
3.	Learn to maximize the efficacy of existing processes.	L4
4.	Understand the importance of HVAC	L4
5.	Understand the importance of using renewable materials and ambient air quality.	L3

CO's-PO's-PSO's mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17RT.1	-	1	2	-	-	-	3	-	-	-	-	1	-	-	-
20A17RT.2	-	1	1	-	-	-	1	-	-	-	-	1	-	-	-
20A17RT.3	-	1	1	-	-	-	1	-	-	-	-	1	-	-	-
20A17RT.4	-	1	1	-	-	-	1	-	-	-	-	1	-	-	-
20A17RT.5	-	1	1	-	-	-	1	-	-	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Disaster Management
Category OEC
Couse Code 20A17ST

Year IV Year
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enable the learner to understand how disasters occur and keep them aware about different disasters.
- To enable students to plan measures against different disasters.
- To make students familiar with the topics of crisis, disaster and emergency management techniques.

Unit 1 Introduction to disasters and Natural Disasters 9

Definitions Of Risk, Vulnerability and Disasters and Their Relationship; Classification of Disasters; Natural Disasters; Environmental and Weather Pre-Conditions Leading To Various Natural Disasters; Floods: Urban Floods; Flash Floods; Cyclones; Earthquakes; Landslides; Avalanches; Mudslides Impacts of Natural Disasters; Important Case Studies (2006 Tsunami, Covid 19 etc.,).

Learning Outcomes: At the end of the unit, the student will be able to learn

- Various natural disasters and what their preconditions.
- Impacts of different natural disasters on different aspects of human life.

Unit 2 Manmade Disaster 10

Classification of Manmade Disasters: Accidents, Industrial Mishaps; Wars – Military, Bio-War and Cyber warfare; Nuclear Disasters; Blackouts; Cyber Attacks, Oil Spills, Compound or Cascading Disaster; Preconditions Various Manmade Disasters; Impacts of Manmade Disasters; Important Case Studies (Bhopal Gas Tragedy, Fukushima Disaster, Ennore Oil Spill, Vizag Styrene Leak).

Learning Outcomes: At the end of the unit, the student will be able to

- Discern between natural and manmade disasters
- Learn about cascading disasters
- Find the reasons why manmade disasters happen and how to avert them.

Unit 3 Crisis and Emergency Management 8

Definition, scope and methods of - Crisis Management, Emergency management; Importance of emergency management, Evacuation plans; mock drills of evacuation; Industrial safety drills; Monitoring of hazardous components in industries and places of public importance.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the importance of crisis and emergency management.
- Understand how evacuation drills are conducted and their importance.
- Devise plans for industrial monitoring and analyse various real-time disasters.

Unit 4 Disaster Risk Reduction 12

Global and national disaster trends, Common Disasters in India, risk analysis, vulnerability and capacity assessment; early warning systems, Disaster management cycle–its phases; prevention, mitigation, preparedness, relief and recovery; structural and nonstructural safety and rehabilitation measures; Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programs in India and the activities of National Disaster Management Authority.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand various phases in disaster management and importance of decision making
- Learn relating risk, vulnerability and capacity.
- Know various stages involved in disaster management and various disaster management authourities.

Unit 5 Aftermath Disaster 8

Post disaster situations; Rebuilding – methods and strategies; Re-development - Methods and strategies; Environmental design; Disaster resistant design in built environment and in industries. Change in land use pattern and its effects on human settlements. Capacity building of the society and the industries against disasters.

Learning Outcomes: At the end of the unit, the student will be able to

- Understand and analyse and understand dealing with post disaster situations.
- Learn the importance of incorporating environment in the design.
- Methods and strategies involved in rebuilding the society.

Prescribed Text Books:

1. Disaster Management, Dr. Mrinalini Pandey, 2014, Wiley India.
2. Introduction to Emergency Management, Bullock et al., 2020, Elsevier.
3. Techniques for Disaster Risk Management and Mitigation, Mohanty et al., 2020, Wiley.

Reference Books:

1. Harsh K Gupta, Disaster Management, 2003, Universities Press.
2. Larry Collins, Disaster Management and Preparedness, 2001, Lewis Publishers.
3. Li et al., Geomatics Solutions for Disaster Management, 2007, Springer International.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the natural disasters and their impacts.	L1
2. Understand the Manmade disasters and their impacts.	L1
3. Understand and plan for disaster risk Reduction	L4
4. Develop disaster accommodating plans for coping up with post disaster	L3
5. Apply the concepts of crisis management.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A17ST.1	-	1	-	-	-	1	1	1	1	-	-	1	-	-	-
20A17ST.2	-	1	-	-	-	1	1	1	1	-	-	1	-	-	-
20A17ST.3	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-
20A17ST.4	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
20A17ST.5	1	1	1	1	-	-	1	1	-	1	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::RAJAMPET
(An Autonomous Institution)

Title of the Course	Energy Auditing Conservation and Management
Category	OEC
Couse Code	20A27RT
Year	IV B. Tech.
Semester	I Semester
Branch	CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To illustrate the present scenario of Energy Production and laws associated with it
- To illustrate the Energy conservation Codes
- To develop Management skills and communications of Energy manager/ Energy Auditor
- To illustrate the techniques, procedures, evaluation and energy audit reporting
- To evaluate life cycle costing analysis and return on investment on energy efficient technologies.

Unit 1 Energy Scenario **9**

Global and Indian energy Scenario. Energy production, consumption and pricing. Long-term energy scenario. Salient features of Electricity Act 2003. Energy Conservation Act – 2001 and its features. Energy poverty and Human Development Indices, Energy and Human Development, Energy development index; Fing the link between economic growth and energy consumption.

Learning Outcomes: At the end of the unit, the student will be able to

- Discuss the Scenario of energy production (L2)
- Explain the Electricity Act 2003 (L2)

Unit 2 Energy conservation **9**

Energy conservation areas, Energy transmission and storage, Plant Lecture wise energy optimization Models, Data base for energy management, Energy conservation through controls, Computer aided energy management, Program organization and methodology. Energy environment interaction, Energy Conservation in Buildings, Energy Efficiency Ratings & ECBC (Energy Conservation Building Code).

Learning Outcomes: At the end of the unit, the student will be able to

- Describe the Energy conservation through controls (L2)
- Discuss the Energy conservation in building with efficiency ratings and code (L2)

Unit 3 Energy Management **9**

History of Energy Management, Definition and Objective of Energy Management and its importance. Need of energy management, General Principles of Energy Management, Energy Management Skills, and Energy Management Strategy. Organizing, Initiating and Managing an energy management program. Roles, responsibilities and accountability of Energy Managers

Learning Outcomes: At the end of the unit, the student will be able to

- Explain the importance of Energy management. (L2)
- Discuss the roles and responsibility of Energy manager (L2)

Unit 4 Energy Audit **9**

Energy audit concepts, Definition, Need and Types of energy audit. Energy Audit Approach and Methodology. Systematic procedure for technical audit. Describing energy audit costs. Duties and responsibilities of energy auditors. Energy audit instruments and their usage for auditing. Report-writing, preparations and presentations of energy audit reports.

Learning Outcomes: At the end of the unit, the student will be able to

- Discuss the concepts of Energy Audit and its types (L2)
- Write the Energy Audit in the form of Report. (L1)

Unit 5 Economic Analysis **9**

Economic analysis methods-cash flow model, time value of money, evaluation of proposals, pay-back method, average rate of return method, internal rate of return method, present value method, life cycle costing approach, Case studies.

Learning Outcomes: At the end of the unit, the student will be able to

- Analyze the benefits of adapting energy efficient equipment's with respect to investment. (L4)
- Analyze the benefits of usage of power factor equipment. (L4)

Prescribed Text Books:

1. Amlan Chakrabarti, Energy Engineering and Management, PHI learning, 2nd edition, 2011.
2. Smith CB, Energy Management Principles, science direct, 2nd edition, 2016.
3. Hamies, Energy Auditing and Conservation; Methods, Measurements, Management & Case discuss. Hemisphere Pub. Corp: Washington, 1980
4. Umesh Rathore, Energy management, S.K.Kataria &Sons,2nd edition,2014

Reference Books:

1. W.R.Murphy, G.Mckay, Energy Management, Butterworth-Heinemann Ltd, 2nd edition, 2009
2. Archie, W. Culp, Principles of Energy Conservation, Mc Graw Hill, 1979
3. Munasinghe, Mohan Desai, Ashok V, Energy Demand: Analysis, Management and Conservation, Wiley Eastern Ltd., New Delhi.1990.
4. A. J. McMichael, D. H. Campbell-Lendrum, C. F. Corvalan, K. L. Ebi, A. Githeko, J. D. Scheraga, A. Woodward, Climate Change and Human Health Risks and Responses, 2003.

Web Resources:

1. www.bee-india.org
2. https://www.youtube.com/watch?v=6vOg-u7c1IE
3. https://www.youtube.com/watch?v=M1zijCmeXJg
4. https://www.youtube.com/watch?v=2zWt-pBCU2I&t=80s

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Describe the energy scenario and laws associated with it.	L2
2. Discuss the technical and commercial aspects of energy conservation	L2
3. Analyze the energy management	L4
4. Discuss the significance and procedure for Energy Audit.	L2
5. Evaluate the pay back periods for energy savings equipment	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A27RT.1	3	2	-	2	-	-	3	-	-	-	-	2	-	-	-
20A27RT.2	2	2	-	2	-	-	2	-	-	-	-	1	-	-	-
20A27RT.3	3	2	-	2	-	-	2	-	-	-	-	-	-	-	-
20A27RT.4	3	2	-	2	-	-	2	-	-	-	-	1	-	-	-
20A27RT.5	2	2	-	1	-	-	2	-	-	-	-	1	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Electric Vehicles
Category OEC
Couse Code 20A27ST

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To explain the concepts and configurations of electric vehicles
- To describe different electric propulsion systems and energy storage devices
- To discuss the different types of electrical vehicles.

Unit 1 Introduction to Electric Vehicles 8

A brief history of Electric Vehicles (EV), Types of EV, advantages over conventional vehicles, limitations of EV, impact on environment of EV technology, disposal of battery, cell and hazardous material and their impact on environment.

Learning Outcomes: At the end of the unit, the student will be able to

- Describe the history of electric vehicles (L2)
- Describe electric vehicle configuration and its components (L2)
- Describe the impact on environment of electric vehicles technology (L2)

Unit 2 Power Management and Energy Sources of EV 8

Power and Energy management strategies and its general architecture of EV, various battery sources, energy storage, battery-based energy storage and simplified models of battery, Battery Management Systems (BMS), fuel cells.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the general architecture of EV (L2)
- Describe various battery energy sources of EV (L2)

Unit 3 Power Electronics in EV 8

Introduction, various power electronics converter topologies and its comparisons, Control of converter operations in EV, battery chargers used in EV.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the various power electronics converter topologies (L2)
- Describe the control of converter operations in EV (L2)

Unit 4 DC and AC Machines & Drives in EV 8

Various types of motors, selection and size of motors, Induction motor drives and control characteristics, Permanent magnet motor drives and characteristics, Brushed & Brushless DC motor drive and characteristics, switched reluctance motors and characteristics.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the various types of motors for EV (L2)
- Describe the characteristics of AC & DC motors (L2)

Unit 5 Design Considerations of EV 8

Design parameters of batteries, ultra-capacitors and fuel cells, aerodynamic considerations, calculation of the rolling resistance and the grade resistance, calculation of the acceleration force, total tractive effort, torque required on the drive wheel, transmission efficiency.

Learning Outcomes: At the end of the unit, the student will be able to:

- Describe the design parameters for EV (L2)
- Describe calculation of tractive effort in EV (L2)

Prescribed Text Books:

1. Iqbal Hussain, "Electric and Hybrid Vehicles Design Fundamentals", 1st Edition, CRC Press, 2003.
2. James Larminie, John Lowry "Electric Vehicle Technology Explained", 1st Edition, John Wiley and Sons, 2003.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", Wiley publication ,2011
4. Allen Fuhs, "Hybrid Vehicles and the future of personal transportation", CRC Press, 2009.

Reference Books:

1. Web course on "Introduction to Hybrid and Electric Vehicles" by Dr. Praveen Kumar and Prof. S Majhi, IIT Guwahati available on NPTEL at https://nptel.ac.in/courses/108/103/108103009/.
2. Video Course on "Electric Vehicles" by Prof. Amit Kumar Jain, IIT Delhi available on NPTEL at https://nptel.ac.in/courses/108/102/108102121/

Web Resources:

1. https://nptel.ac.in/courses/108/106/108106170/
2. https://nptel.ac.in/courses/108/102/108102121/
3. https://nptel.ac.in/courses/108/103/108103009/
4. https://nptel.ac.in/courses/108/106/108106182/

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Explain the operation of electric vehicles	L2
2. Choose a suitable drive scheme for developing an electric vehicle depending on resources	L1
3. Choose proper energy storage systems for vehicle applications.	L1

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A27ST.1	-	2	-	3	-	-	2	-	3	-	-	-	-	-	-
20A27ST.2	3	-	-	2	-	3	-	-	3	-	-	-	-	-	-
20A27ST.3	3	2	2	-	-	-	-	-	2	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Optimization in Engineering
Category OEC
Course Code 20A37RT

Year IV B. Tech
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To enable the students to the nature and scope of various decision making situations within business contexts, understand and apply operations research techniques to industrial applications.
- To learn the fundamental techniques of Operations Research and to choose a suitable OR technique to solve problem.

Unit 1 **10**

Linear Programming Problem: Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

Learning Outcomes: At the end of the unit, the student will be able:

- Formulate practical problems given in words into a mathematical model. (L3)
- Quantify OR models to solve optimization problems. (L3)
- Formulate linear programming problems and appreciate their limitations.(L3)

Unit 2 **10**

Transportation Problem: Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment Problem – Formulation – Optimal solution - Variants of Assignment Problem-Travelling Salesman problem

Learning Outcomes: At the end of the unit, the student will be able to:

- Model linear programming problems like the transportation. (L3)
- Solve the problems of transportation from origins to destinations with minimum time and cost.(L3)

Unit 3 **10**

Theory Of Games: Introduction – Minimax - Maximin – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – m X 2, 2 X n & m x n games -Graphical method, Dominance principle.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify strategic situations and represent them as games. (L3)
- Solve simple games using various techniques.(L3)

Unit 4 **10**

Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite queue length models.

Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Queuing problems – Advantages and Disadvantages – Simulation Languages.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and will apply the fundamentals of waiting lines in real life situations. (L3)
- Simulate queuing models. (L3)

Unit 5 **10**

Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks.

Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic programming- shortest path problem – linear programming problem.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand and will apply the fundamentals of inventory in real life situations. (L3)
- Have aware of applying Dynamic Programming technique to solve the complex problems by breaking them into a series of sub- problems. (L3)

Prescribed Text Books:

1. PS Gupta, DS Hira, Operations Research, S Chand Publications, 10th Edition, 2016, ISBN-13978-8121902816.
2. S.D. Sharma, Operations Research, Kedarnath and Ramnath Publications, 2012, ISBN-135551234001596.

Reference Books:

1. Taha, Introduction to Operations Research. PHI, 10th edition, 2016, ISBN-13978-0134444017.
2. R. Panneerselvam, Operations Research. PHI Publ, 2nd edition, 2004, ISBN: 9788120319233.
3. Sharma J.K., Operations Research: Theory and Applications, 4th Edition, Laxmi Publications, 2009.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Create mathematical models of the real life situations and capable of obtaining best solution using Graphical Method and Simplex Method, Big M method and the student must be able to implement the theory of duality for simplifying the solution procedure for certain LPPs.	L3
2. Solve the special cases of LPP such as Transportation, Assignment and Travelling Salesmen problems.	L3
3. Knowledge of choosing the best strategy out of the available strategies which is an essential skill for any business manager to successfully face the competition.	L3
4. Understand and will apply the fundamentals of waiting lines in real life situations.	L3
5. Simulate queuing models	L3
6. Apply Dynamic Programming technique to solve the complex problems by breaking them into a series of sub- problems.	L3
7. Understand and will apply the fundamentals of inventory in real life situations.	L3

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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20A37RT.2	3	3	2	-	-	-	3	-	-	-	-	-	-	-	-
20A37RT.3	3	3	-	-	-	-	3	-	-	-	-	-	-	-	-
20A37RT.4	3	3	2	-	-	1	3	-	-	-	-	-	-	-	-
20A37RT.5	3	3	-	-	-	1	3	-	-	-	-	-	-	-	-
20A37RT.6	3	3	-	-	-	-	3	-	-	-	-	-	-	-	-
20A37RT.7	3	3	-	-	1	-	3	-	-	-	-	-	-	-	-

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Industrial Management & Entrepreneurship
Category OEC
Course Code 20A37ST

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To create awareness to learn principles, concepts, functions of management
- To learn the concepts of financial management.
- To learn the concepts of production, material &project management.
- To get awareness on Human Resource Management and its functions
- To analyze the need of entrepreneur development.

Unit 1 General management 10

Management definition, functions of management and principles of management. Forms of Business Organization: Salient features of Sole Proprietorship, Partnership, Joint Stock Company; Private Limited and Public Limited companies; Cooperative and Government owned companies; Merits and Demerits of above types; Marketing Management: Functions of Marketing; Concepts of Selling and Marketing- Difference; Market Research; Product pricing; Distribution channels; Marketing mix (4 Ps); Advertising and sales promotion; Product life cycle

Learning Outcomes: At the end of the unit, the student will be able to

- explain concepts of management (L2)
- explain form Business Organization(L2)
- discuss 4Ps of Marketing (L2)

Unit 2 Financial Management 8

Concept of time value of money; Interest formulae; Present and Future worth amounts for different cash flow patterns; Evaluation of alternative investment proposals (Capital budgeting); Types of Capital-Fixed and Working capital; Working capital management- Factors and Principles; Depreciation- Straight line depreciation, declining balance and Sum of Years digits methods

Learning Outcomes: At the end of the unit, the student will be able to:

- explain concepts of time value of money, depreciation(L2)
- Evaluation of investment proposals(L3)

Unit 3 Production and Materials Management 12

Functions of Production planning and control; Production systems-Types; Inventory control-Relevant costs, EOQ, Deterministic single item model with static demand, ABC, VED and FSN analysis; Introduction to MRP.

Project management, network modeling-probabilistic model, various types of activity-times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method -critical path calculation-crashing of simple of networks

Learning Outcomes: At the end of the unit, the student will be able to:

- Production and Materials Management (L2)
- explain the concept of PERT (L4)
- Demonstrate Project Crashing. (L3)

Unit 4 Human Resources Management 7

Concepts of HRM, Functions of personnel management, human resource planning, recruitment, selection, placement, training and development and performance appraisal. Motivation theories, leadership styles

Learning Outcomes: At the end of the unit, the student will be able to:

- explain the concept of HRM (L2)
- distinguish between Personnel Management and HRM (L3)
- Discuss Training and Development methods. (L2)

Unit 5 Entrepreneur Development 8

Introduction, Entrepreneurial characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship, Role of communication in entrepreneurship; Entrepreneurial Development-Objectives, Need of Training for enterprises; Finance for the enterprises; Product, Process and Plant Design- Product analysis and Product Design process. Steps in process design and Plant Design

Learning Outcomes: At the end of the unit, the student will be able to:

- outline the functions of an entrepreneur
- discuss product, process & plant design

Prescribed Text Books:

1. Industrial Engineering and Operations Management, S.K.Sharma, Savita Sharma and Tushar Sharma.
2. Industrial engineering and production management, Mahajan
3. Operations Management, Joseph G Monk.

Reference Books:

1. Industrial Economics, R.R.Bharatwal
2. Financial Management I.M.Pandey.
3. Projects, Prasanna Chandra.
4. Small Industry Ram K Vepa

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the principles and practices of general management.	L2
2. Understand the various issues of financial management.	L3
3. Acquire knowledge on production and material management & concepts of PERT, CPM & Crashing of simple networks.	L4
4. Learn the functions of personnel management	L3
5. Understand the importance of entrepreneur development	L2

COs-POs-PSOs Mapping Table:

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20A37ST.1	3	3	-	-	-	2	-	3	3	3	-	-	-	-	-
20A37ST.2	3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
20A37ST.3	3	3	-	1	-	2	-	3		3	2	-	-	-	-
20A37ST.4	-	-	-	-	-	-	-	3	3	3	-	2	-	-	-
20A37ST.5	3	3	2	-	-	2	1	3	3	-	2	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Electronic Circuits & its Applications
Category OEC
Couse Code 20A47RT

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To analyze and design the transistor and feedback amplifiers.
- To understand and analyze the concepts of oscillators

Unit 1 SINGLE STAGE AMPLIFIERS 10

Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model, Analysis of CE amplifier with emitter resistance and emitter follower, Miller's theorem and its dual, Design of single stage RC coupled Amplifier using BJT.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of basic transistor amplifier circuits.
- Design and analysis of single stage amplifiers using BJTs

Unit 2 MULTISTAGE AMPLIFIERS 10

Analysis of Cascaded RC coupled BJT amplifiers, Cascode Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the purpose of cascading single stage amplifiers
- Analyze the different types of amplifiers, operation and it's characteristics.

Unit 3 FEEDBACK AMPLIFIERS 12

Concept of feedback amplifiers, General characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics. Voltage series, voltage shunt, current series and current shunt feedback amplifiers with discrete components (Topologies).

Learning Outcomes: At the end of the unit, the student will be able to :

- Understand the concepts of feedback amplifiers
- Analyze the effect of negative feedback on amplifier characteristics
- Design and analysis of various feedback amplifiers

Unit 4 OSCILLATORS 10

Condition for oscillations, Oscillator types, Frequency and amplitude stability of oscillators, LC oscillators - Hartley and Colpitts oscillators, RC phase shift and Wein bridge oscillators, Crystal Oscillators.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic principle of oscillator circuits.
- Design and Analysis of different oscillator circuits

Unit 5 LARGE SCALE AMPLIFIERS 8

Classification of Power amplifiers-Class A power Amplifiers- Direct coupled and Transformer Coupled, Class B power Amplifiers- Push-pull and Complementary Symmetry-Transistor power dissipation, Power and Efficiency calculations, Distortion of Power Amplifiers.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the concepts of different power amplifiers
- Determine the efficiencies of various power amplifiers

Prescribed Text Books:

1. Millman and Christos C. Halkias- "Integrated Electronics", Mc Graw-Hill, 1972.
2. Robert T. Paynter- "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition.

Reference Books:

1. Robert L. Boylestad and Louis Nashelsky - "Electronic Devices and Circuits Theory", Pearson/Prentice Hall, 9th Edition, 2006.
2. Donald A. Neumann- "Electronic Circuit Analysis and Design", Mc Graw Hill
3. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to — Blooms Level of Learning

1. Analyze the single stage and multi-stage amplifiers using h-parameter model at low frequencies — L4
2. Understand the feedback amplifiers and oscillators — L2
3. Analyze the concepts of large signal amplifiers — L4
4. Understand the working principle and operation of oscillators — L2
5. Analyze the concepts of large signal amplifiers — L4

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A47RT.1	3	3	2	3	3	1	-	-	2	-	-	-	-		-
20A47RT.2	3	3	2	3	3	1	-	-	2	-	-	-	-	-	-
20A47RT.3	1	3	3	2	2	-	-	-	2	-	-	-	-	-	-
20A47RT.4	1	3	3	2	2	-	-	-	2	-	-	-	-	-	-
20A47RT.5	3	3	3	2	2	1	-	-	2	-	-	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Introduction to Communication Systems
Category OEC
Couse Code 20A47ST

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To learn the fundamental concepts of Analog and Digital communication systems
- To understand the different analog and digital modulation and demodulation techniques
- To know the effect of noise in communications

Unit 1 AMPLITUDE MODULATION 9

Introduction to communication system, Elements of communication system, Need for modulation, Types of Modulation, Amplitude Modulation, Generation and Detection of AM, DSB-SC, SSB, VSB Waves.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the fundamental concepts of analog communication systems.
- Gain the knowledge on different Amplitude modulation and demodulation techniques

Unit 2 ANGLE MODULATION & NOISE 11

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Detection of FM Signals, Comparison of FM & AM.

Noise: Types of noise, noise in analog communication systems

Learning Outcomes: At the end of the unit, the student will be able to:

- Learn the generation and detection of FM signals
- Learn the various types of noise and its effects on analog communication systems

Unit 3 PULSE ANALOG MODULATION 9

Introduction, The Sampling process, Types of Pulse modulation, Generation & demodulation of PAM, PWM and PPM, comparison, Multiplexing-TDM, FDM

Learning Outcomes: At the end of the unit, the student will be able to :

- Understand the generation and detection of PAM, PWM and PPM
- Learn the different multiplexing concepts

Unit 4 PULSE DIGITAL MODULATION 9

Elements of digital communication system, advantages of digital communication systems, Elements of PCM, Bandwidth requirements of PCM, Noise in PCM Systems, Differential PCM systems (DPCM), Delta modulation systems, Adaptive delta modulation, comparison between PCM and DM

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the basic concepts of digital communication system.
- Gain Knowledge on PCM ,DPCM and DM

Unit 5 DIGITAL CARRIER MODULATION SCHEMES 9

Introduction, Binary ASK, FSK and PSK Signaling Scheme-Generation and detection methods, DPSK and DEPSK, Introduction to M-ary Signaling, Comparison of all Digital carrier Modulation Schemes.

Learning Outcomes: At the end of the unit, the student will be able to:

- Learn the ASK, FSK and PSK signaling schemes
- Analyze the various digital modulation schemes

Prescribed Text Books:

1. Simon Haykin, John Wiley- Principles of Communication systems , 2nd Ed.,
2. K. Sam Shanmugam – Digital and Analog Communication Systems, Wiley, 2010.
3. Simon Haykin-Digital Communication, Wiley, 2006

Reference Books:

1. H Taub & D. Dchilling, Gautam Sahe- Principles of Communication Systems, TMH, 2007 3rd Edition
2. John G. Proakis, Masood Salehi- Fundamentals of Communication Systems PEA, 2006.
3. R.P.Singh & S.D.Sapre- Communication Systems Analog & Digital, TMH, 2008

Course Outcomes:

At the end of the course, the student will be able to — Blooms Level of Learning

1. Design simple systems for generation and detection of AM, DSB, SSB and VSB signals — L6
2. Understand the concepts of the angle modulation & demodulation along with noise analysis. — L2
3. Analyze the various pulse amplitude modulation and demodulation techniques — L4
4. Understand the different digital modulation techniques — L2
5. Understand the different digital carrier modulation techniques — L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A47ST-1	3	1	-	-	-	1	-	-	-	3	-	2	-	-	-
20A47ST-2	3	3	1	-	-	1	-	-	-	2	-	2	-	-	-
20A47ST-3	3	3	1	-	-	1	-	-	-	2	-	2	-	-	-
20A47ST-4	3	3	2	2	2	-	-	-	-	3	2	2	-	-	-
20A47ST-5	3	3	2	2	2	-	-	-	-	3	2	2	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course Human Resource Management
Category OEC
Course Code 20AE7AT

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- The course is designed broadly to promote understanding of procurement, development, maintenance, evaluation and overall effective utilization of manpower.

Unit 1 Introduction to Human Resource Management 10

Introduction-Definition-Nature of HRM-Scope of HRM-Functions of HRM-Managerial functions and Operative functions-Role of HRM-Personnel Management and HRM-Competitive challenges influencing HRM- Ethical aspects of HRM.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the differences between Personnel and Human resource Management (L2)
- Identify the ethical issues to be followed in the organization (L1)

Unit 2 Manpower Planning , Job analysis and Job design 12

Introduction to Manpower Planning- Nature of HRP-Need and Importance of HRP in Organizations-Factors affecting HRP-HRP process-Barriers to HRP- Human Resource Information System.

Job analysis: Definitions, Nature of Job analysis, process of Job analysis-methods of collecting job data.

Job design: Definition-Factors affecting Job Design-Job design Approaches.

Learning Outcomes: At the end of the unit, the student will be able to:

- Identify the need of Manpower planning in Organizations' (L1)
- Find the basic requirements of job analysis and job design (L1)

Unit 3 Recruitment and Selection of Human Capital 10

Recruitment: Nature of Recruitment-Purpose and Importance- Factors governing Recruitment-Recruitment process- Sources of Recruitment.

Selection: Nature of Selection-Selection Process- Selection tests-Barriers to effective selection.

Placement and orientation.

Learning Outcomes: At the end of the unit, the student will be able to:

- Determine the requirements of recruitment and selection (L3)
- Prepare himself when attending for different selection tests (L3)

Unit 4 Training and Development 10

Nature of Training and Development-Inputs in Training and development-Benefits of Employee Training-Training Process-Training Methods-Impediments to effective training-Career development: Definition-Initiatives-stages.

Learning Outcomes: At the end of the unit, the student will be able to:

- Extend the dynamic aspects of training and its applicability for the growth of organization(L2)
- Apply Training methods in order to make training effective(L3)

Unit 5 Evaluation and Compensation management 10

Performance Appraisal: Nature-objectives-Appraisal Process-Methods of Appraisal.

Compensation: Objectives-Objectives of Remuneration-Theories of Remuneration-Wage policy in India-Concept of Wages.

Grievance process- Importance and Approaches of Industrial relations-Collective Bargaining.

Learning Outcomes: At the end of the unit, the student will be able to:

- Understand the various performance appraisal methods in an Organization(L2)
- Finds ways for evaluating compensation related pay in various organizations(L1)

Prescribed Textbooks:

1. K.Aswathappa, Human Resource Management: Text and cases, The McGraw-Hill Companies, 5th Edition,.
2. P.SubbaRao, Personnel and Human Resource Management, Himalaya Publishing House, 5th Revised Edition.

Reference Books:

1. Noe A.Raymond, John Hollenbeck, Barry Gerhart and Patrick Wright, Human Resource Management, Tata Mc Graw Hill.
2. Ian Beardwell & Len Holden, Human Resource Management, Macmillan India Ltd.
3. Ivansevich, Human Resource Management, Tata McGraw Hill, 10th Edition.
4. Dessler Gary, Human Resource Management, Prentice Hall, 10th Edition.
5. Bernardi, Human Resource Management, Tata McGraw Hill, 4th Edition.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the basics of Human Resource Management.	L2
2. Know the basic requirements of Job and the way of designing the jobs in the organization.	L1
3. Apply different Recruitment and selection techniques in their practical life when attending for recruitment and selection processes.	L3
4. Get awareness of various Training and Development methods in the Organization.	L2
5. Identify various types of performance appraisal methods and compensation designs in the organization.	L1

CO's-PO's-PSO's Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AE7AT.1	-	-	-	-	-	-	-	2	-	-	-	3	-	-	-
20AE7AT.2	-	-	1	-	-	-	-	-	3	-	-	3	-	-	-
20AE7AT.3	-	-	1	-	-	-	-	-	-	-	3	3	-	-	-
20AE7AT.4	-	-	-	-	-	-	-	3	-	-	3	-	-	-	-
20AE7AT.5	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Intellectual Property Rights
Category OEC
Course Code 20AE7BT

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- To introduce fundamental aspects of Intellectual property rights to student who are going to play a vital role in development and management of innovative projects in industries
- To disseminate knowledge of kinds and types of intellectual property in India and abroad and registration aspects.
- To get aware about current trend in IPR and government steps in fostering IPR

Unit 1 Concept of Property **12**

Meaning of Property, Kinds of property: Movable and Immovable property; Tangible and Intangible property; Intellectual property; Private and Public property. Possession and ownership.

Learning Outcomes: At the end of the unit, the student will be able to:

- Explain the meaning of property and kinds of properties (L1)
- Able to distinguish between different types of properties (L4)

Unit 2 Intellectual Property Rights **12**

Introduction and the need for Intellectual Property Rights (IPR), IPR in India – Genesis and Development, Forms of Intellectual Property- Copyright, Trademarks, Patents, Designs, Geographical Indicators, Merchandise, Franchise and Forms of Unfair Competition. Competing rationales of the legal regimes for the protection of Intellectual Property.

Learning Outcomes: At the end of the unit, the student will be able to:

- To get awareness of need for Intellectual Property Rights (IPR) (L1)
- To acquire knowledge in different forms of Intellectual Property- Copyright, Trademarks, Patents, Designs and Geographical Indicators (L2)

Unit 3 Copyrights & Trademarks **14**

Copy Right: Meaning of Copyright, Copyright in literary, dramatic, musical work and cinematograph films Ownership, Assignment, Author's special rights, Importation and infringement, Fair use provisions. Trademarks: Definition; conception of trademarks, Registration, Distinction between trademark and property mark, Standards of proof in passing off action.

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the meaning of Copyright and infringement (L1)
- find the importance of Trademarks and its registration(L1)

Unit 4 Patents, Designs and Geographical Indicators **14**

Conception of Patent, Patentable Inventions, Process of obtaining a Patent: application, examination, opposition and sealing of patents; Rights and obligations of a Patentee, International Patents, Transfer of technology, know-how and problems of self-reliant development. Basic provisions related to Designs, Geographical Indicators.

Learning Outcomes: At the end of the unit, the student will be able to:

- understand the role of patent in innovation and Process of obtaining a Patent (L1)
- acquire knowledge about basic provisions related to Designs and Geographical Indicators (L2)

Unit 5 International Instruments Concerning Intellectual Property Rights 10

The Berne Convention, Universal Copyright Convention, The Paris Union, The World Intellectual Property Rights Organization (WIPO), UNESCO, TRIPS, TRIMS, and WTO.

Learning Outcomes: At the end of the unit, the student will be able to:

- Become familiar with international instruments concerning intellectual property (L2)
- Able to understand role of The World Intellectual Property Rights Organization (WIPO) and WTO in promoting IPRs(L2)

Prescribed Textbooks:

1. Intellectual Property Rights: Basic Concepts, MMS Karki, Atlantic, 2009.
2. Intellectual Property Rights, Pandey, Neeraj, Dharani, Khushdeep.

Reference Books:

1. Intellectual Property Rights in India: General Isuues and Implications, Dr. PrankrishnaPal, Regal Series.
2. Intellectual Property, W.R. Cornish, Sweet & Maxwell, London, 2012.
3. Principles of Intellectual Property, N.S. Gopalakrishnan & T.G. Agitha, Eastern BookCompany, Lucknow, 2009.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Gain awareness about Intellectual Property Rights (IPRs).	L2
2. Acquire adequate knowledge in the kinds of Intellectual Property Rights (IPRs).	L1
3. learn the process of patent filing and registration in India	L3
4. Learn the basic concepts of relating to copy rights, trademarks, geographical indications and others Intellectual properties.	L2
5. Gain more insights into the regulatory aspects of Intellectual Property Rights (IPRs). in India	L2

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20AE7BT-1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-
20AE7BT-2	2	-	2	-	2	-	2	-	2	-	-	1	-	-	-
20AE7BT-3	-	2	-	-	-	2	1	3	-	2	1	-	-	-	-
20AE7BT-4	1	-	2	-	-	-	-	1	-	-	-	-	-	-	-
20AE7BT-5	-	1	-	2	-	-	-	2	-	-	2	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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(Can also be handled by the faculty members of other departments who underwent FDP on UHV conducted by AICTE, New Delhi)

Title of the Course	Universal Human Values - II
Category	HSMC
Couse Code	20AC71T
Year	IV B. Tech.
Semester	I Semester
Branch	Common to all

Lecture Hours	Tutorial Hours	Practical	Credits
2	1	0	3

Course Objectives:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection
- Development of commitment and courage to act

Unit 1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education **6**

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process;
- 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit 2 Understanding Harmony in the Human Being - Harmony in Myself! **6**

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body
- Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss programs for ensuring health vs dealing with disease.

Unit 3 Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship **6**

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education, etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit 4 Understanding Harmony in the Nature and Existence -Whole existence as Coexistence **6**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc.

Unit 5 Implications of the above Holistic Understanding of Harmony on Professional Ethics **6**

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a). Ability to utilize the professional competence for augmenting universal human order b). Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c). Ability to identify and develop appropriate technologies and management patterns for the above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a). At the level of individual: as socially and ecologically responsible engineers, technologists and managers b). At the level of society: as mutually enriching institutions and organizations
- Summing up.

Include practice Exercises and Case Studies (tutorial) Sessions e.g., to discuss the conduct of an engineer or a scientist, etc.

Prescribed Textbooks

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

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar Kantak, 1999.
2. N. Tripathi, Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. The Story of My Experiments with Truth
5. E. FSchumacher. Small is Beautiful

6. Cecile Andrews, Slow is Beautiful
7. J C Kumarappa. Economy of Permanence
8. Pandit Sunderlal. Bharat Mein Angreji Raj
9. Dharampal, Rediscovering India.
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. Maulana Abdul Kalam Azad. India Wins Freedom
12. Romain Rolland. Vivekananda (English)
13. Romain Rolland. Gandhi (English)
14. Jawaharlal Nehru. Rediscovery of India

Course Outcomes:

Upon successful completion of the course, student will	Blooms Level of Learning
1. Become more aware of themselves, and their surroundings (family, society, nature)	L2
2. Become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	L2
3. Have better critical ability.	L3
4. Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	L3
5. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	L4

COs-POs-PSOs Mapping Table:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC71T.1	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.2	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.3	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.4	-	-	-	-	-	-	-	-	-	-	-	3
20AC71T.5	-	-	-	-	-	-	-	-	-	-	-	3

Assessment pattern for UHV-2

The Assessment Pattern for Universal Human Values-II course is described hereunder.
UHV-2 course carries two credits. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.
A student has to secure 40% marks out of 100 in the CIE and SEE together to qualify for the award of the degree. The distribution shall be 50 marks for continuous internal assessment and 50 marks for semester end examination.
Internal evaluation shall be conducted for the course during semester and shall be evaluated for 50 marks and distributions of marks as follows:

- Assessment by faculty mentor: 10 marks
- Self-assessment: 10 marks
- Assessment by peers: 10 marks
- Socially relevant project/ Group Activities/Assignments: 20 marks

Semester End examination is conducted for 50 marks and is of 2 hours duration. The question paper shall be of subjective type with 5 questions, one question from each unit, with internal choice. All the questions carry equal marks of 10 each.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Mobile Application Development
Category SC-Skill Advanced Course
Couse Code 20A571L

Year IV B. Tech.
Semester I Semester
Branch CSE, AI&DS and AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives:

- Understand develop Applications in android environment
- Develop user interface applications
- Develop data persistence, messaging, location based services.

Module 1 **Theory Hours: 4, Practice sessions: 8**

Step by step installation of Android studio and understanding the development environment, Understanding activities, linking activities using intents, fragments

Learning Outcomes: At the end of the unit, the student will be able to

- Understand the procedure of installing Android studio and the development environment (L2)
- use activities and fragments in the programs (L3)

Module 2 **Theory Hours: 3 , Practice sessions: 6**

Displaying notifications, Understanding the components of a screen, adapting to display orientation, managing changes to screen orientation, utilizing the action bar, and listening for UI notifications.

Learning Outcomes: At the end of the unit, the student will be able to:

- Displaying notifications, use screen orientation(L2)
- Perform some aspects on user interfaces(L3)

Module 3 **Theory Hours: 3, Practice sessions: 6**

Using basic views, using picker views, using list views to display long lists, Using image views to display pictures-Gallery and Image View views, using menus with views, analog and digital clock views.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply various views and list (L4)
- Use clocks and images in their applications(L3)

Module 4 . **Theory Hours: 3, Practice sessions: 6**

Saving and loading user preferences, persisting data to files, creating and using databases. SMS messaging, sending E-mail.

Learning Outcomes: At the end of the unit, the student will be able to:

- Apply the data storage services(L4)
- Implement the messaging services in applications(L5)

Module 5 **Theory Hours: 04, Practice sessions: 6**

Location based services**:** Displaying maps, getting a location data, monitoring a location, building a location tracker.

Learning Outcomes: At the end of the unit, the student will be able to:

- Deploy google location based service (L5)
- Implement the location based services in their applications (L6)

Prescribed Text Book:

1. Beginning Android programming with android studio 4th edition, J. F. DiMarzio, Published by John Wiley & Sons, Inc.

Reference Books:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. Use activities and fragments in the programs.	L3
2. Understand the implementation aspects of user interfaces.	L3
3. Apply of image view and data storage services.	L4
4. Implement the messaging services in applications	L5
5. Deploy and implement the location based services in their applications	L6

COs-POs-PSOs Mapping Table:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A571L.1	3	-	3	-	3	-	-	-	-	-	-	-	3	-	-
20A571L.2	3	-	3	-	3	3	-	-	3	-	3	-	3	-	-
20A571L.3	3	-	3	-	3	3	-	-	3	-	3	-	3	-	3
20A571L.4	3	-	3	-	3	3	-	-	3	-	-	-	3	2	3
20A571L.5	3	-	3	-	3	-	-	-	-	-	-	-	3	2	3

PROGRAM OUTCOMES

A graduate of Computer Science & Engineering will have ability to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. **Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Understand, analyze and develop essential proficiency in the areas related to artificial intelligence and data science in terms of underlying statistical and computational principles and apply the knowledge to solve practical problems.

PSO2: Implement Artificial Intelligence and data science techniques such as search algorithms, neural networks, machine learning and data analytics for solving a problem and designing novel algorithms for successful career and entrepreneurship.

PSO3: Apply the skills in the areas of health care, education, agriculture, intelligent transport, environment, smart systems and in the multi-disciplinary area of Artificial Intelligence and Data Science.