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

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	C Programming Lab	0	0	3	1.5
10	*MC*	*20AC16T*	*Environmental Science*	*2*	*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	20AC35T	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	Digital Systems	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	Digital Systems Lab	0	0	3	1.5
9	Skill oriented course	20A2231L	Advanced Python Programming	1	0	2	2
10	*MC*	*20AC34T*	Life Sciences	*2*	*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	20A444T	Microprocessor & Interfacing	3	0	0	3
2	PCC	20A541T	Design and Analysis of Algorithms	3	0	0	3
3	PCC	20A2241T	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 & Interfacing Lab	0	0	3	1.5
7	PCC(LAB)	20A2242L	Design and Analysis of Algorithms and Operating Systems Lab	0	0	3	1.5
8	PCC(LAB)	20A2241L	Artificial Intelligence and Data Science Lab	0	0	3	1.5
9	Skill oriented course	20A2243L	R 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	20A2251T	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	20A225AT	MOOC	2	0	2	3
5	PEC	20A225BT	Artificial Neural Networks	3	0	0	3
		20A225CT	Pattern Recognition				
		20A225DT	Scalable Algorithms for Data Analysis				
		20A225ET	Health Care Analytics				
6	PCC(LAB)	20A2251L	Data Mining Lab	0	0	3	1.5
7	PCC(LAB)	20A552L	Computer Networks Lab	0	0	3	1.5
8	Skill advanced course	20A2252L	Block Chain Technology	1	0	2	2
9	MC	20AC53T	Essence of Indian Traditional Knowledge	2	0	0	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)				0	0	0	1.5
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

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	20A2261T	Automata and Compiler Design	3	1	0	3
2	PCC	20A2262T	Machine Learning	3	0	0	3
3	PCC	20A2263T	Big Data Analytics	3	0	0	3
4	PEC	20A226AT	Reinforcement Learning	3	0	0	3
		20A226BT	Computational Intelligence				
		20A226CT	Advanced Data Mining				
		20A226DT	Optimization Techniques				
5	OEC	20A226ET	MOOC	2	0	2	3
6	PCC(LAB)	20A2261L	Automata and Compiler Design Lab	0	0	3	1.5
7	PCC(LAB)	20A2262L	Machine Learning Lab	0	0	3	1.5
8	PCC(LAB)	20A2263L	Big Data Analytics Lab	1	0	1	1.5
9	Soft skill course	20AC61L	Professional Communication	1	0	2	2
	MC	20AC62T	Constitution of India	2	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

Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PEC	20A227AT	Fuzzy Logic and its Applications	3	0	0	3
		20A227BT	Information Retrieval Systems				
		20A227CT	Deep Learning				
		20A227DT	Advanced Databases				
2	PEC	20A227ET	Data Science for IOT	3	0	0	3
		20A227FT	Robotics and Automation				
		20A227GT	Natural Language Processing				
		20A227HT	Intelligent Systems				
3	PEC	20A227IT	Cognitive Science	3	0	0	3
		20A227JT	Advanced Artificial Intelligence				
		20A227KT	Cyber Security and Forensic Science				
		20A227LT	Augmented Reality				
4	OEC		Other Departments should offer	2	0	2	3
5	OEC / JOE	20A227MT	Social Media Analytics	2	0	2	3
		20A227NT	Visual Computing				
		20A227OT	Intelligent Communications and Networking				
		20A227PT	Artificial Intelligence of Things				
6	HSMC	20AC71T	Universal Human Values-II	3	0	0	3
7	Skill advanced course	20A2271L	Visualization and App Development	1	0	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester				0	0	0	3
					Total credits		23
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

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

Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ	20A2281P	Project work, seminar and internship in industry	0	0	0	12
			Internship (6 months)				
						Total credits	12

OPEN ELECTIVE COURSES (OFFERED TO OTHER DEPARTMENTS)

S. No.	Category	Course Code	Course Title	Credits	Offered by	Offered to
1	OEC		Artificial Intelligence	3	AI&DS	
2	OEC		Machine Learning	3	AI&DS	
3	OEC		Data Science	3	AI&DS	
4	OEC		Software Engineering	3	AI&DS	
5	OEC		Internet of Things	3	AI&DS	
6	OEC		R Programming	3	AI&DS	
7	OEC		Database Management Systems	3	AI&DS	
8	OEC	20A55FT	Data Structures through python	3	AI&DS	Common to EEE,ME,ECE

SKILL / JOB ORIENTED COURSES (OFFERED by CSE TO OTHER DEPARTMENTS)

S. No.	Category	Course Code	Course Title	Credits	Offered by	Offered to all other Departments
1	SKILL / JOB	20A535L / 20A545L	Python Programming	2	AI&DS	Common to CE / Common to EEE,ME,ECE
3	SKILL / JOB	20A564L	Java Programming	2	AI&DS	Common to CE,EEE,ME,ECE

TOTAL CREDITS DISTRIBUTION

S.NO	Category	CSE
1	BSC	21
2	MC	0
3	ESC	24
4	PCC	51
5	PEC	15
6	OEC / JOE	12
7	HSMC	10.5
8	SKILL	10
9	INTERNSHIP	4.5
10	PW	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, AIDAS

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
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: *On the Conduct of Life* **by William Hazlitt**; 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 this 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
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2 9

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: *The Brook* **by Alfred Tennyson**; 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 this unit, the student will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well-structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3 9

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: *The Death Trap* **by Saki**; 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
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit 4 9

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: *Muhammad Yunus;* 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
- understand verbal and non-verbal features of communication and hold formal/informal

conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5   9
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: *The Dancer with a White Parasol* **by Ranjana Deve**; 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
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Prescribed Textbook:
1. Language and Life published by 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. Oxford Learners Dictionary, 12th Edition, 2011
8. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
9. 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

CO-PO Mapping:

Department of Artificial Intelligence & Data Science

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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, AIDAS

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-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 electrode, Electrochemical Cell, Galvanic Cell vs. Electrolytic Cell, Electrochemical conventions, 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 (L4)
- 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 (L4)
- 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 (L4)
- 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, Dhanapat Rai & Sons, 2018

Reference Books:
1. Shashi Chawla, A textbook of Engineering chemistry, 3/e, Dhanapat 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	L4
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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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 Common to all branches of Engineering

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 Eigenvectors 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

CO-PO Mapping:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course Problem Solving through C programming

Category ES
Couse Code 20A511T

Year I B. Tech
Semester I Semester
Branch Common to CE, EEE, ME, ECE, CSE, AIDS

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.
- Approach the programming tasks using techniques learned and write pseudo-code.
- Choose the right data representation formats based on the requirements of the problem.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

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.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

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.
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

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.
- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.

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.
- Develop and test C programs for simple applications using files.

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, Yeswanth Kanitkar, 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, 2ndEdition, 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

CO-PO Mapping:

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

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

Title of the Course Engineering Workshop

Category ESC
Couse Code 20A314L

Year I B.Tech
Semester I Semester
Branch Common to CSE & AIDS

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** 03
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.

Trade 2 **Sheet metal shop** 03
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

Trade 3 **Fitting shop** 03
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.

Trade 4 **House-wiring** 03
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.

Trade 5 **Demonstration** 01
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.

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

CO-PO Mapping:

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
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Title of the Course   IT Workshop

Category   ESC   Lab
Couse Code   20A512L

Year   I Year
Semester   I Semester
Branch   CSE

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
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 unit, the student will be able to:
- Identify the parts of a computer
- Know the usage of internal parts of a computer

Task 2
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 unit, the student will be able to:
- Trouble shoot the computer and identify working and non-working parts
- Identify the problem correctly by various methods available (eg: beeps).

Task 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 unit, the student will be able to:
- Install another operationg systems
- Know how to install softwares

Task 4
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 unit, the student will be able to:
- Share the information between two computers
- Connect two or more computers using switch/hub

Task 5
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 unit, the student will be able to:
- Create e-mail account and send email
- Browse internet for required information

Task 6
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 unit, the student will be able to:
- Install different antivirus softwares
- Check threats to the computer being used

Task 7
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 unit, the student will be able to:
- Prepare project documents, user manuals
- Get the knowledge on word processor tool

Task 8
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 unit, the student will be able to:
- Create , open and save spread sheets
- Apply formulas for different tasks

Task 9
Presentations: creating, opening, saving and running the presentations, selecting the style for slides,

formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, 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 unit, the student will be able to:
- Create , open and save slides
- Create their own presentations for seminars

Task 10

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 unit, the student will be able to:
- Know the usage of google drive
- Create and share google docs in web browser

Prescribed Text Books:
1. Introduction to Information Technology, ITL Education Solutions limited,Pearson Education.
2. Upgrading and RepairingPC's, 22nd Edition, Scott Muller QUE, PearsonEducation.
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEYDreamtech.
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, CiprianRusen, 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

CO-PO Mapping:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course   Communicative English Lab
Category   HSMC
Couse Code   20AC15L

Year   I B. Tech.
Semester   I Semester
Branch   CE, ME, CSE & AIDS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives:
1. To learn better English pronunciation
2. To use language effectively in everyday conversations
3. To make formal oral presentations using effective strategies in professional life
4. 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 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

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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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
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Title of the Course   Chemistry Lab
Category   BSC
Couse Code   20AC13L

Year   I B. Tech.
Semester   I Semester
Branch   CSE, AIDAS

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
From the following list, any 10 experiments must be performed in a semester
1. Determination of Zinc by EDTA method.
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. Conductometric titration of Acid mixture against Strong base
9. Determination of strength of an acid by pH metric method
10. Determination of viscosity of a liquid
11. Determination of functional groups in the given organic compound
12. 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. explain the functioning of instruments such as pH meter, conductivity meter and potentiometer.	L4
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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC13L/23L 1	3	2										2
20AC13L/23L 2	3	2										2
20AC13L/23L 3	3	2										2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course   C Programming Lab

Category   ES
Couse Code   20A511L

Year   I B. Tech
Semester   I Semester
Branch   Common to CE, EEE, ME, ECE, CSE, AIDS

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 are to be done students

<u>Data Types, constants, Input and Output and expressions</u>

Exercise l: (week-1): Data types, Variables, Constants and Input and Output.
Exercise 2 :(week-2): Operators, Expressions and Type Conversions.
Learning Outcomes: At the end of the unit, the student will be able to:
- Identify situations where computational methods and computers would be useful.
- Approach the programming tasks using techniques learned and write pseudo-code.
- Write the program on a computer, edit, compile, debug, correct, recompile and run it.

<u>Decision control statements and Arrays</u>

Exercise 3:(week-3): Conditional Statements [two way and multipath].
Exercise 4:(week-4): Loop Control Statements. [for, while and do-While]
Exercise 5:(week-5): Unconditioned JUMP Statements- break, continue, goto.
Exercise 6:(week-6): Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7:(week-7): Multidimensional Arrays
Learning Outcomes: At the end of the unit, the student will be able to:
- Choose the right data representation formats based on the requirements of the problem.
- Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- Identify tasks in arrays with different techniques that are applicable and apply them to write programs.
- Design and implement operations on both single and Multidimensional arrays.

<u>Strings and Functions</u>

Exercise 8:(week-8): String Basics, String Library Functions and Array of Strings.
Exercise 9:(week-9): Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10:(week-10): Storage classes- Auto, Register, Static and Extern

Exercise 11:(week-11): Recursive Functions, Preprocessor commands.
Exercise 12:(week-12): Array Elements as Function Arguments.
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.
- Analyze programming problems to choose when regular loops should be used and when recursion will produce a better program

Pointers
Exercise 13:(week-13): Pointers, Dynamic memory allocation and error handling
Learning Outcomes: At the end of the unit, the student will be able to:
- Design and develop Computer programs, analyzes, and interprets the concept of pointers and their usage.
- 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.

Structures and Files
Exercise 14:(week-14): Structures
Exercise 15:(week-15): File handling
Learning Outcomes: At the end of the unit, the student will be able to:
- Define structure data types and use them in simple data processing applications.
- Develop and test C programs for simple applications using files.

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, Yeswanth Kanitkar, 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, 2ndEdition, 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	L3
3. Identify and rectify the syntax errors and debug program for semantic errors	L3
4. Solve problems in a modular approach using functions	L4
5. Implement file operations with simple text data	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A511L.1	3	2	-	2	2	-	-	-	2	2	1	-	3		
20A511L.2	2	2	-	-	-	-	-	-	1	-	-	-	3		
20A511L.3	3	3	3	3	-	-	-	-	1	-	-	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
(An Autonomous Institution)

Title of the Course	Environmental Science	
Category	MC	
Couse Code	20AC16T	

Year   I B.Tech
Semester   I sem
Branch   CE, ME, CSE, AIDAS

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	0

Course Objectives:
- To make the student to get awareness on environment and understand the importance of protecting natural resources.
- To enable the student to know the importance of ecosystems and biodiversity for future generations.
- To make the student to know pollution problems due to the day-to-day activities of human life.
- To enable the student to 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.
- Know about the various natural resources.

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:
- Know about the concept of ecosystem.
- Know about the importance of biodiversity.

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:
- Know about the different types of pollution.
- Know about various sources, effects and control measures of pollution.

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:
- Know about social issues related to environment.
- Know about importance of environmental acts.

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:
- Know about the effects of population explosion.
- Identify the natural assets and their relationship.

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
6. Explain how natural resources should be used.   L2
7. Identify the need to protect ecosystems and biodiversity for future generations.   L3
8. List out the causes, effects, and control measures of environmental pollution.   L1
9. Demonstrate knowledge to the society in the proper utilization of goods and services. L2
10. Outline the interconnectedness of human dependence on the earth's ecosystems.   L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC16T.1	1	1				3	3	1				3
20AC16T.2	1	2				3	3	1				3
20AC16T.3		1				3	3	1				3
20AC16T.4	2					3	3	1				3
20AC16T.5	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 19AC22T

Year I B. Tech.

Semester II Semester

Branch CSE & AIDAS

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 & TVS. Arun murthy "A Text book of Engineering Physics"-S.Chand Publications,11th editioin,2019
2. K Thyagarajan "Applied Physics"-McGraw Hill Education (India) Private Ltd,2019

Reference Books:
1. David J. Griffiths, Introduction to Electrodynamics, 4/e, Pearson Education,2014
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
4. 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 & L3

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.

   L2 & 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 nanomaterials with their applications in various engineering branches.

   L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20AC22T.1	3	2	2									
20AC22T.2	3	2	2									2
20AC22T.3	3	2	2									2
20AC22T.4	3	1										
20AC22T.5	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	ES
Course Code	20A223L
Year	I B. Tech.
Semester	II Semester (Common to CE,CSE, & AIDS)

Lecture Hours	Tutorial Hours	Practical	Credits
3	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

Course Outcomes	Program Outcomes												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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 Differential Equations and Vector Calculus

Category BSC

Course Code 20AC21T

Year I B. Tech

Semester II Semester

Branch CE, EEE, ME, ECE, CSE & AIDS

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   10
                 coefficients**

Definitions-complete solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particularintegral 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   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 using Charpit's method, solutions of boundary value problems by using method of separation of variables.

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, Del applied to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl- del applied twice to scalar point function,

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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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   ES
Course Code   20A223T
Year   I B.Tech.
Semester   II Sem (common to CE, CSE and AIDS)

Lecture Hours	Tutorial Hours	Practical	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.
   • understand the Kirchhoff's laws

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
   • analyze the performance of DC machines
   • know the speed control methods of DC motor

Unit 3   AC Machines   9
1-Φ Transformer: Principle of operation, emf equation, losses, efficiency and regulation calculations using OC and SC tests. 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
   • analyze the performance of various AC machines

Unit 4   Diode and Transistor   9
Diode: PN junction diode, symbol, v-icharacteristics, 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
   • know the applications of PN junction diode

- understand the operation of various types of BJTs
- understand operating characteristics of CE configuration of BJTs

Unit 5   Measuring Instrumentsand Electrical Installations   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.
- understand the construction and operation of measuring instruments.
- know the various electrical installations

Prescribed Text Books:
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:

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. understand the various electrical installations and measuring instruments	L1

COs-POs-PSOs Mapping Table

Course Outcomes	Program Outcomes												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
20A223T.1	2	2	-	2	-	-	-	-	2	-	2	-	2	2
20A223T.2	2	3	2	2	-	-	-	-	2	-	2	-	2	3
20A223T.3	2	3	2	2	-	-	-	-	2	-	2	-	2	3
20A223T.4	2	2	-	3	-	-	-	-	2	-	2	-	2	2
20A223T.5	2	2	1	3	-	-	-	-	2	-	2	-	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 Common for CSE & AIDS

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.
- Identify the curves obtained in different conic sections and able to draw different conic curves.
- Know and draw the different Cycloidal curves, also its practical application in engineering.

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.

Learning Outcomes: At the end of the unit, the student will be able to:
- Understand the principles and elements of projection.
- Know how to draw the projections of points, lines.
- Differentiate between projected length and true length and also find the true length of the lines.

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.
- Identify and Construct the true shapes of the plane surfaces.
- Analyze the projections of plane surface inclined to both the planes.

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.
- Draw projection of simple solids.
- Draw the Projections of solids inclined to both the reference planes.

Unit 5	**Isometric Projections & Conversion of Views.**	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.
- Draw the Isometric views of simple plane surfaces and simple solids.
- Draw the conversions of Isometric Views in to Orthographic Views and Vice-versa.

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 ConicSections.	L1, L2
2. Understand the concept of Cycloidal Curves, Involutes and the application of industrystandards.	L2, L3
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.	L2, L3
4. Understand and apply Orthographic Projections ofPlanes.	L1, L2, L3
5. Understand and analyze the Orthographic Projections of Solids and conversion of isometric views to orthographic views viceversa.	L3, L4

CO-PO Mapping:

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
(An Autonomous Institution)
Department of Computer Science and Engineering

Title of the Course	Data Structures through Python	
Category	ESC	
Couse Code	20A521T	

Year	I B. Tech
Semester	II Sem
Branch	CSE

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
- Apply the List, set and dictionary

Unit 2   10
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
- Define object oriented concepts like class, object

Unit 3   9
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
- Demonstrate and classify error and exception handling

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
- Illustrate data structures like stack queue and linked list

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 the importance of binary trees and priority queues
- Outline and use the search trees

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

CO-PO Mapping:

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

ANNAMACHRYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(An Autonomous Institution)
Department of Humanities and Sciences

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

Year I B. Tech.
Semester II sem
Branch CSE & AIDAS

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. Determine 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. Dispersive power of a diffraction grating
5. Resolving power of a grating
6. Determination of dielectric constant by charging and discharging method.
7. 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
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.	L2
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

CO-PO MAPPING:

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

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

Title of the Course Data Structures through Python Lab

Category ESC
Couse Code 20A521L

Year I B. Tech
Semester II Sem
Branch CSE

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
1. Install Python ecosystem and execute "Hello World" program.
2. Practice
    a. Python literals, variables, identifiers and data types
    b. Python operators
    c. Input and output statements.
    d. Control statements
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
4. Practice python programs on Various types of triangle patterns
5. Implement python programs on functions, find factorial and Fibonacci number using recursion
6. Practice python programs on lists, sets and dictionaries
7. Practice any one python program on module design
8. Practice python programs on string processing and exception handling
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
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.
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.
12. Implement python programs on
        i) Stacks   ii) Queues
13. Implement Single linked list data structure.

14. Implement priority queue data structure.
15. Implement binary search tree data structure.

Prescribed Text Books:
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2. Data Structures and Algorithms using Python, Rance D.Necaise, Wiley Publications.

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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

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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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