ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET (AUTONOMOUS)

Department of Electrical and Electronics Engineering

VISION AND MISSION OF THE DEPARTMENT

Vision

We envision the Department as one of the best in the region with a stimulating Environment to make an impact on, and lead in the field through its Education and Research

Mission

The mission of the Department is to provide an excellent and comprehensive education in the field of Electrical and Electronics Engineering which in turn mould students for a wide range of careers and to exhibit a high level of Professionalism, ethical behavior and social responsibility

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To experience success in Electrical & Electronics Engineering and other diverse fields that requires analytical and technical skills.

PEO2: To prepare students to identify and implement global, societal needs and constraints in designing new technology/product and follow professional ethics.

PEO3: To inculcate in students professional attitude, effective communication skills and leadership qualities to succeed in multi-disciplinary teams.

PEO4: To promote students to pursue professional development by continuous learning relevant to their career.

PROGRAMME OUTCOMES(POs)

A graduate of Electrical and Electronics Engineering will have ability to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make

1. Effective presentations, and give and receive clear instructions

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMMME SPECIFIC OUTCOMES

1. Able to analyze, design, and implement electrical & electronics systems and deal with the rapid pace of industrial innovations and developments
2. Skillful to use application and control techniques to conventional and non-conventional energy systems.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES
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RAJAMPET
Department of Electrical and Electronics Engineering
I B. Tech - Zero Semester

Phase	Course Code	Name of the course	Lecture	Practical
Regular Phase	19A501	Proficiency classes: Familiarity with a computer	2	2
Regular Phase	19AC01	Proficiency classes: English Communication Skills	2	2
Regular Phase	19A502	Basics of Programming and Lab	3	2
Regular Phase	19AC02	Foundation classes in Mathematics	3	0
Regular Phase	19AC03	Foundation classes in Physics	3	2
Regular Phase	19AC04	Foundation classes in Chemistry	3	2
Regular Phase	19AC05	Universal Human Values	2	0
Regular Phase	19A301	Fundamentals of Engineering Drawing	1	0
Regular Phase	-	Physical education activities – Sports and Games	0	1
Non daily	-	Creative Arts		
Non daily	-	Lectures by eminent personalities		
Non daily	-	Visits to local area		
Non daily	-	Extra-curricular activities		

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Course Structure for R19 Regulations
I Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC12T	Applied Physics	3	-	-	3
2	BS	19AC11T	Algebra and Calculus	3	1	-	4
3	ES	19A511T	Problem Solving and C Programming	3	-	-	3
4	ES	19A411T	Essentials of Electrical & Electronics Engineering	2	-	-	2
5	ES	19A312T	Engineering Graphics & Design	1	-	3	2.5
Lab Courses							
6	BS	19AC12L	Applied Physics Lab	-	-	3	1.5
7	ES	19A313L	Engineering & IT Workshop	-	-	3	1.5
8	ES	19A511L	C Programming Lab	-	-	3	1.5
9	ES	19A411L	Essentials of Electrical & Electronics Engineering Lab	-	-	2	1
				12	1	14	20

I Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	HS	19AC25T	Functional English and Life Skills	3	-	-	3
2	ES	19A522T	Programming Through Python	3	-	-	3
3	BS	19AC24T	Engineering Chemistry	3	-	-	3
4	BS	19AC21T	Differential Equations and Vector Calculus	3	1	-	4
5	ES	19A421T	Electronic Devices and Circuits	2	-	-	2
6	MC	19AC26T	Environmental Science	3	-	-	-
Lab Courses							
7	HS	19AC25L	Communicative English Lab	-	-	3	1.5
8	ES	19A522L	Programming Through Python Lab	-	-	2	1
9	BS	19AC24L	Engineering Chemistry Lab	-	-	3	1.5
10	ES	19A421L	Electronic Devices and Circuits Lab	-	-	2	1
				17	1	10	20

II Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC31T	Partial Differential Equations and Complex Variables	3	-	-	3
2	PC	19A231T	Analog Electronics	3	-	-	3
3	PC	19A232T	Circuit Theory	3	-	-	3
4	PC	19A233T	Electrical Machines-I	3	-	-	3
5	PC	19A234T	Switching Theory and Logic Design	3	-	-	3
6	ES	19A337T	Fluid Mechanics and Hydraulic Machinery	2	1	-	3
7	MC	19AC35T	Essence of Indian Traditional Knowledge	3	-	-	-
Lab Courses							
8	ES	19A337L	Fluid Mechanics and Hydraulic Machinery Lab	-	-	2	1
9	PC	19A231L	Analog Electronics lab	-	-	2	1
10	PC	19A233L	Electrical Machines -I Lab	-	-	2	1
				20	1	6	21

II Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	BS	19AC42T	Numerical Methods and Transform Techniques	3	-	-	3
2	PC	19A241T	Electrical Machines -II	3	-	-	3
3	PC	19A242T	Electromagnetic Fields	3	-	-	3
4	PC	19A243T	Generation and Transmission of Electric Power	3	-	-	3
5	PC	19A244T	Linear Control Systems	3	-	-	3
6	PC	19A245T	Network Analysis and Synthesis	3	-	-	3
7	BS	19AC44T	Life Sciences for Engineers	2	-	-	2
8	MC	19AC47T	Constitution of India	3	-	-	-
Lab Courses							
8	PC	19A241L	Electrical Machines -II Lab	-	-	3	1.5
9	PC	19A245L	Electrical Circuits and Simulation Lab	-	-	3	1.5
				23	0	6	23

III Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	HS	19A354T	Management Science	3	-	-	3
2	PC	19A251T	Electrical and Electronic Measurements	3	-	-	3
3	PC	19A252T	Power Electronics	3	-	-	3
4	PC	19A253T	Power System Analysis	3	-	-	3
5	PE	19A25AT	Digital Control Systems	3	-	-	3
		19A25BT	Special Electrical Machines				
		19A25CT	Modern Control Theory				
6	OE	19A25DT	Fuzzy Logic and Neural Network	3	-	-	3
		19A25ET	Battery Energy Storage Systems				
		19A25FT	System Modeling and Simulation				
Lab Courses							
7	PC	19A254L	Electrical Measurements Lab	-	-	2	1
8	PC	19A255L	Control Systems & Simulation Lab	-	-	2	1
9	HS	19AC52L	Professional Communication Skills Lab	-	-	3	1.5
				18	0	7	21.5

III Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A261T	Microprocessors and Microcontrollers	3	-	-	3
2	PC	19A262T	Power System Operation and Control	2	-	-	2
3	PC	19A263T	Switch Gear and Protection	3	-	-	3
4	PE	19A26AT	High Voltage Engineering	3	-	-	3
		19A26BT	Electrical Machine Design				
		19A26CT	Utilization of Electrical Energy				
5	PE	19A26DT	Instrumentation	3	-	-	3
		19A26ET	Fundamentals of HVDC & FACTS Devices				
		19A26FT	Advanced Power Electronic Converters				
6	OE	19A26IT	Open Elective-2 (MOOCS)	3	-	-	3
Lab Courses							
7	PC	19A264L	Power System Simulation Lab	-	-	2	1
8	PC	19A265L	Power Electronics & Simulation Lab	-	-	2	1.5
9	HS	19AC61L	General Aptitude	1	-	-	1
9	INTERN	19A264I	Innovative project / Socially relevant project / Entrepreneurship / Internship	-	-	-	2
				18	0	4	22.5

IV Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19A271T	Distribution of Electric Power	3	-	-	3
2	PC	19A272T	Power Semiconductor Drives	3	-	-	2
3	PE	19A27AT	Renewable Energy Systems	3	-	-	3
		19A27BT	Smart Grid				
		19A27CT	Principles of Power Quality				
4	PE	19A27DT	Programmable Logic Controllers	3	-	-	3
		19A27ET	Hybrid Electric Vehicles				
		19A27FT	Digital Signal Processing				
5	OE	19A17GT	Basic Civil Engineering	3	-	-	3
		19A17HT	Water Resources and Conservation				
		19A37JT	Introduction to Mechatronics				
		19A37KT	Fundamentals of Robotics				
		19A37LT	Non-Conventional Sources of Energy				
		19A47GT	Electronic Circuits and its Applications				
		19A47HT	Basics of Communication Systems				
		19A57ET	Artificial Intelligence				
		19A57FT	Cyber Security				
Lab Courses							
6	PC	19A273L	Power Systems Lab	-	-	2	1
7	PC	19A274L	Microprocessors and Microcontrollers Lab	-	-	2	1
8	PW	19A275P	Project Phase-I	-	-	-	2
				15	0	4	18

IV Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE	19A28AT	Design of Electrical Systems	3	-	-	3
		19A28BT	Distributed Energy systems				
		19A28CT	Energy Auditing and Demand Side Management				
2	OE	19A18DT	Disaster Management	3	-	-	3
		19A18ET	Building Planning and Construction				
		19A38ET	Entrepreneurship Development				
		19A38FT	Optimization in Engineering				
		19A38GT	Total Quality Management				
		19A48DT	Introduction to Digital Design				
		19A48ET	Industrial Electronics				
		19A58ET	Internet of Things				
		19A58FT	Web Programming				
Lab Courses							
3	PW	19A281P	Project Phase-II	-	-	-	8
				6	-	-	14

OPEN ELECTIVE COURSES (For Other Departments offered by EEE)

S. No.	Category	Course Code	Course Title	Offered to
1	OE2	19A26GT	Energy Management and Conservation	CE, ME & CSE Students
2	OE2	19A26HT	Fuzzy Logic and Neural Network	
3	OE3	19A27GT	Energy Management and conservation	ECE Students (For CE,ME & CSE-MOOCS)
4	OE3	19A27HT	Fuzzy Logic and Neural networks	
5	OE4	19A28DT	Battery Energy Storage Systems	CE, ME, CSE & ECE Students
6	OE4	19A28ET	System Modeling and Simulation	

List of Value-added Courses

1. Introduction to MATLAB Programming Techniques.
2. MATLAB SIMULINK for Electrical Systems
3. Electrical CAD
4. Internet of Things Applications to Electrical Engineering
5. Microcontrollers and Embedded Systems
6. PCB Design
7. PLC & SCADA
8. Solar Energy Course

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Applied Physics
Category	BS
Couse Code	19AC12T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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.

Unit 2 Dielectric and Magnetic materials 9

Introduction-Dielectric polarization-Dielectric polarizability- Susceptability 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 theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

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 (qualitative).

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile,- Propagation of electromagnetic wave through optical fiber –modes-importance of V number-attenuation-Block diagram of fiber optic communication- Medical Applications-Fiber optic Sensors.

Unit 4 Semiconductors 9

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 - 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.

Unit 5 Superconductors and Nano materials 9

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

Nano materials – significance of nanoscale - properties of nanomaterials: physical: mechanical, magnetic, Optic, 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.

Prescribed Text Books

1. M.N. Avadhanulu, P. G. Kshirsagar & TVS. Arunmurthy "A Text book of Engineering Physics", S. Chand Publications,11th editioin,2019
2. H. K. Malik & A .K. Singh "Engineering Physics",- McGraw Hill Publishing Company Ltd, 2018

Reference Text Books:

1. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc Graw Hill 2013
2. David J. Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
3. Gerd Keiser "Optical Fiber Communications"- 4/e, Tata McGrawHill ,2008
4. Charles Kittel "Introduction to Solid State Physics",Wiley Publications,2011
5. S.M.Sze "Semiconductor devices-Physics and Technology"-Wiley,2008

Course Outcomes:

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.	L3 &L2
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
19AC12T .1	3	2	2	-	-	-	-	-	-	-	-	-
19AC12T .2	3	2	2	-	-	-	-	-	-	-	-	2
19AC12T .3	3	2	2	-	-	-	-	-	-	-	-	2
19AC12T .4	3	1	-	-	-	-	-	-	-	-	-	-
19AC12T .5	3	2	2	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Algebra and Calculus
Category	BS
Couse Code	19AC11T
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE& CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- This course will 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 Matrix Operations and Solving Systems of Linear Equations 9

Rank of a matrix by echelon form - solving system of homogeneous and non-homogeneous linear equations by rank method - Eigen values and Eigen vectors - their properties.

Unit 2 9

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 forms by orthogonal transformation

Unit 3 Functions of several variables 9

Partial derivatives - total derivatives - chain rule - change of variables – Jacobian - maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers for three variables.

Unit 4 Mean value theorems and curve tracing 9

Taylor's and Maclaurin's theorems (without proofs) – simple problems.
Curve tracing – Cartesian and polar curves.

Unit 5 Multiple Integrals and Special Functions 9

Double integrals: Evaluation - change of order of integration - change of variables (Cartesian to polar) - areas enclosed by plane curves and Evaluation of triple integral.
Beta and Gamma functions and their properties - relation between beta and gamma functions.

Prescribed Text Books

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

Course Outcomes:

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. Understand mean value theorems to real life problems and will understand the applications of curve tracing	L2
5. Solve important tools of calculus in higher dimensions and be familiar with 2-dimensional, 3- dimensional coordinate systems and also learn the utilization of special functions	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC11T.1	3	3	-	-	-	-	-	-	-	-	-	3
19AC11T.2	3	2	-	-	-	-	-	-	-	-	-	3
19AC11T.3	3	3	-	-	-	-	-	-	-	-	-	2
19AC11T.4	3	3	-	-	-	-	-	-	-	-	-	2
19AC11T.5	3	3	-	-	-	-	-	-	-	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Problem Solving and C programming
Category	ES
Couse Code	19A511T
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 9

Problem Solving: 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

Unit 2 9

Introduction to decision control statements: 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.

Unit 3 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.

Unit 4 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.

Unit 5 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.

Prescribed Text Books

1. 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 Text 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, 2nd Edition, 2017
6. ReemaTharaja “Introduction to C Programming”, Second Edition, OXFORD Press, 2015.

Course Outcomes:

At the end of the course, students 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:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A511T.1	1	2	2	3	-	1	-	-		-	-	-
19A511T.2	3	3	3	3	3	-	-	-	1	-	-	-
19A511T.3	3	2	1	2	1	-	-	-	1	-	-	2
19A511T.4	2	3	2	2	3	-	-	-	1	-	1	2
19A511T.5	3	2	2	2	2	-	-	-	1	-	-	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Essentials of Electrical & Electronics Engineering
Category	ES
Course Code	19A411T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:
- To learn the basic fundamentals of circuit components, circuit laws and network theorems
- To understand the concepts of semiconductor diode and its applications
- To understand the basic concepts of Bipolar Junction transistor

Unit 1 Circuit Elements 9

Sources: Voltage and Current Sources, Resistors-Types- resistance color coding-potentiometer-types, Capacitors-types-uses of capacitors, Inductors-types, Ohm's Law-R, L, C Voltage, Current, Power & Energy.

Unit 2 Network Theorems (D.C. Excitation Only) 9

Ohm's law, Kirchhoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin'sTheorem- Norton's Theorem- Superposition Theorem-maximum power transfer theorem.

Unit 3 Semiconductor Diodes 9

Energy Band Diagram of Semiconductors (Intrinsic & Extrinsic), PN Diode, Drift & Diffusion currents, V-I Characteristics of PN Junction Diode (Ideal, Simplified and Piece-wise, Practical), Temperature Dependency, Transition and Diffusion Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics &Zener diode acts as a regulator.

Unit 4 Diode Applications 9

Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter – RC Filter, Choke Filter, LC Filter, π-Filter.

Unit 5 Introduction of BIT 9

Transistor constructions – types. Transistor operation in CB, CE and CC configurations and their Characteristics, Multimeter, CRO, DSO, Function Generator

Prescribed Text Books:
1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press
2. "Circuits & Network Analysis & Synthesis", Sudhakar. A & Shyammohan S Palli, 4th Edition, Tata McGraw Hill, 2010
3. Engineering basics: Electrical, Electronics and computer Engineering" T.Thyagarajan, New Age International, 2007
4. Electronic Devices and Circuits, G K.Mithal

Reference Text Books:
1. Electronic Devices and Circuits, J. Millman and Halkias, 1991 edition, 2008, TMH
2. Electronic Devices and Circuit Theory, Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI
3. Electronic Principles, Albert Malvino, David J Bates, MGH, SIE 2007
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the circuit component voltage, current, power and energy relations and their types.	L2
2. Apply the circuit simplification techniques	L3
3. Demonstrate the knowledge of semiconductor diodes.	L2
4. Understand the operation and usage of Rectifiers and filters.	L2
5. Understand the basic concepts of Bipolar Junction Transistor	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A411T.1	2	2	-	-	-	-	-	-	-	-	-	2
19A411T.2	3	3	3	3	3	-	-	-	-	-	-	3
19A411T.3	2	2	-	-	-	-	-	-	-	-	-	2
19A411T.4	2	2	2	-	-	-	-	-	-	-	-	2
19A411T.5	2	-	2	-	-	-	-	-	-	-	-	2

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

Title of the Course	Engineering Graphics & Design
Category	ES
Course Code	19A312T
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
1	-	3	2.5

Course Objectives:

- To learn engineering drawing sketches and dimensioning.
- To learn basic engineering drawing formats.
- To increase ability for communicating with engineers around the world.
- To prepare the student for future Engineering positions.

PART – A Manual Drawing

Unit 1 Introduction Theory Hours: 05 Practice sessions: 04

Principles of Engineering Graphics and their significance - Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method, concentric circles method – Parabola - Rectangle method and Tangent method – Rectangular Hyperbola
.

Unit 2 Cycloidal Curves Theory Hours: 03 Practice Sessions: 06

Cycloid, Epicycloid and Hypocycloid (treatment of simple problems only)
Involutes – Square, Pentagon, Hexagon and Circle.

Unit 3 Projections of Points and Lines Theory Hours: 05 Practice Sessions: 04

Projections of Points and Projections of Lines-inclined to one reference plane - inclined to both reference planes, finding the True lengths.

Unit 4 Projections of Planes Theory Hours: 04 Practice Sessions: 05

PROJECTIONS OF PLANES: Projections of regular Plane surfaces inclined to one reference plane and both reference planes.

Unit 5 Projections of Solids & Conversion of Views

Projections of Solids: Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference and both reference planes.
Conversion of Views: Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

PART – B : Computer Aided Drafting (For Internal Evaluation Weightage only)
Theory Hours: 03 Practice Sessions: 03

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. Dimensioning principles and conventional representations. Free hand sketches on isometric views to orthographic views.

Prescribed Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, Edition 2016
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub, Edi 2016

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age, Ed 2015.
2. Engineering Drawing, Johle, Tata McGraw-Hill. Ed 2014
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education Ed 2015

Course Outcomes:

Student will be able to,	Blooms Level of Learning
1. Understand the concepts of Conic Sections.	L1, L2
2. Understand the concept of Cycloidal Curves, Involutes and the application of industry standards.	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 of Planes.	L1, L2, L3
5. Understand and analyze the Orthographic Projections of Solids and conversion of isometric views to orthographic views vice versa.	L3, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A312T.1	3	-	-	-	-	3	2	-	1	2	-	-
19A312T.2	3	-	-	-	-	3	2	-	1	2	-	-
19A312T.3	3	2	-	-	-	3	2	-	1	2	-	-
19A312T.4	3	2	-	-	-	3	2	-	1	2	-	-
19A312T.5	3	-	2	-	2	2	-	3	3	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Applied Physics Lab
Category	BS
Couse Code	19AC12L
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- Understand 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.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

List of Experiments

1. Determination of the thickness of the wire using wedge 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 of variation of B versus H by magnetizing the magnetic material (B-H curve)
10. Determination of the numerical aperture of a given optical fiber and hence to find its acceptance angle
11. Measurement of magnetic susceptibility by Gouy's method
12. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
13. Determination of the resistivity of semiconductor by Four probe method
14. Determination of the energy gap of a semiconductor
15. Measurement of resistance with varying temperature.

Reference Text Book:

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Operate various optical instruments and estimate various optical parameters.	L2
2. Estimate the Various magnetic parameters	L2
3. Measure properties of a semiconductors	L3
4. Determine the properties dielectric materials and optical fiber materials	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC12L.1	3	-	-	-	-	-	-	-	-	-	-	-
19AC12L.2	3	1	-	-	2	-	-	-	-	-	-	-
19AC12L.3	2	-	-	-	2	-	-	-	-	-	-	-
19AC12L.4	3	2	-	-	2	-	-	-	-	-	-	-

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

Title of the Course Engineering & IT Workshop
Category ES
Course Code 19A313L

Year I B.Tech
Semester I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Engineering Workshop

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.

Trades for exercises Practice hours: 24
Carpentry shop– Two 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.
Sheet metal shop– Two jobs (exercises) from: Tapered Tray, cylinder, conical funnel from out of 22 or 20 gauge G.I. sheet
Fitting shop– Two jobs (exercises) from: square Fit, V-Fit, Semi-circular fit, dove tail fit from M.S. stock
House-wiring– Two jobs (exercises) from: Parallel and Series, Two-way switch, Tube –Light connection, Stair case connection
Trades for demonstration:
- Plumbing
- Machine Shop
- Metal Cutting
- Soldering and Brazing

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

Course Outcomes:

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. Apply fitting operations in various assemblies.	L3
4. Apply basic electrical engineering knowledge for house wiring practice.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A313L.1	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.2	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.3	3	-	1	-	1	-	-	-	-	-	-	1
19A313L.4	2	-	1	-	1	-	-	-	-	-	-	1

IT Workshop

Course Objectives: This course will

- 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.
- Demonstrate the disassembling and assembling of a personal computer system.

Preparing your Computer Practice hours: 9

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.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and troubleshooting a computer.

Task 3: Install Operating System: Student should install MS Windows on the computer. Students should record the entire installation process.

Internet Practice hours: 3

Task 4: 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, and search process using different natural languages, and creating e-mail account.

Productivity tools Practice hours: 9

Task 5: 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.

Task 6: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 7: 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.

Prescribed Text Books:

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

Reference Text 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

Course Outcomes:

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 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
19A313L.5	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.6	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.7	3	3	1	-	3	-	-	-	-	-	-	3
19A313L.8	3	3	1	-	3	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	C Programming Lab
Category	ES
Course Code	19A511L
Year	I B.Tech
Semester	I Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives: This course will
- 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 in a modular fashion
- Manage data using files

Minimum number of FOUR programmes from the list of experiments are to be done by students.

Exercise I (week-1): Data types, Variables, Constants and Input and Output.
Exercise 2:(week-2): Operators, Expressions and Type Conversions.
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, go to.
Exercise 6:(week-6): Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7:(week-7): Multidimensional Arrays
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.
Exercise 13:(week-13): Pointers and structures.
Exercise 14:(week-14): Dynamic memory allocation and error handling.
Exercise 15:(week-15): File handling

Recommended Systems/Software Requirements: Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Prescribed Text Books:
1. C and Data Structures, E. Balaguruswamy, Tata McGraw Hill
2. Let Us C, Yeswanth Kanitkar, Ninth Edition, BPB Publication

References:
1. https://www.cprogramming.com/
2. https://www.mycplus.com/tutorials/c-programming-tutorials

Course Outcomes:

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
19A511L.1	3	2	-	2	2	-	-	-	2	2	1	-
19A511L.2	2	2	-	-	-	-	-	-	1	-	-	-
19A511L.3	3	3	3	3	-	-	-	-	1	-	-	3
19A511L.4	3	3	3	3	-	-	-	-	-	-	-	3
19A511L.5	3	3	3	3	-	-	-	-	-	-	-	3

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

Title of the Course	Essentials of Electrical & Electronics Engineering Lab
Category	ES
Course Code	19A411L
Year	I B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- To determine the characteristics of semiconductor diode
- To perform various rectifier circuits in practical approach
- To perform input and output characteristics of BJT for various configurations

List of Experiments

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJTs.
2. Study and operation of
    - Multi-meters (Analog and Digital)
    - Function Generator
    - Regulated Power Supplies
    - CRO
3. Verification of Kirchhoff's Voltage and Current Law.
4. Forward and Reverse Bias Characteristics of PN junction Diode.
5. V-I Characteristics of Zener Diode
6. Half Wave Rectifier with and without filter.
7. Full Wave (Center trapped) Rectifier with and without filter.
8. Full Wave (Bridge) Rectifier with and without filter.
9. Zener Diode as a Voltage Regulator.
10. Input and Output Characteristics of Transistor CB Characteristics.
11. Input and Output Characteristics of Transistor CE Characteristics.
12. Input and Output Characteristics of Transistor CC Characteristics.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Determine the parameters like cut-in voltage, resistances and breakdown voltage of semiconductor diode	L5
2. Design DC power supply circuits using rectifiers and filters	L6
3. Choose the desired configuration for specified applications	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A411L.1	2	2	-	-	-	-	-	-	-	-	-	-
19A411L.2	-	2	-	-	-	-	-	-	-	-	2	-
19A411L.3	-	-	2	-	-	-	-	2	-	-	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Functional English and Life Skills
Category	HS
Course Code	19AC25T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives:

- To focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- 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
- To build self-confidence, encourage critical thinking, foster independence and help people to communicate more effectively.

Unit 1 9

Reading: *On the Conduct of Life* by William Hazlitt
Life Skills: 'Values and Ethics' with reference to Rudyard Kipling's poem '*If*'
Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Unit 2 9

Reading: *The Brook* by Alfred Tennyson
Life Skills: 'Self-Improvement' with reference to George Bernard Shaw's speech '*How I Became a Public Speaker'*
Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Unit 3 9

Reading: *The Death Trap* by Saki
Life Skills: 'Time Management' with reference to an extract from Seneca's letter to his friend '*On Saving Time'*
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.
Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Unit 4 9

Reading: *ChinduYellamma*
Life Skills: 'Innovation' with reference to the life of 'Muhammad Yunus'
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms
Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables

Unit 5 9

Reading: *Politics and the English Language b*y George Orwell
Life Skills: 'Motivation with reference to Ranjana Deve's article 'The Dancer with a White Parasol'

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Writing: Writing structured essays on specific topics using suitable claims and evidences

Prescribed Text Books
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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. read, scan and skim texts such as literary forms, journalistic articles and scientific readings for comprehension and retention	L2
2. exhibit self-confidence and innovative thinking and communicate more effectively	L3
3. understand the factors that influence the use of grammar and vocabulary in speech and writing and formulate sentences with grammatical accuracy	L2
4. produce coherent and unified paragraphs with adequate support and detail	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC25T.1	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.2	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.3	-	-	-	-	-	-	-	-	-	3	-	2
19AC25T.4	-	-	-	-	-	-	-	-	-	3	-	2

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

Title of the Course	Programming Through Python
Category	ES
Course Code	19A522T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To learn basics of computational problem solving, python programming and basic control structures.
- To understand python programming basic constructs like lists, dictionaries, sets and functions
- To learn module design and usage of text files in python programming
- To understand basics of object-oriented programming.
- To understand elementary data structures like linked list, stacks and queues.

Unit 1 9

Computational problem solving, 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.

Unit 2 9

Lists: List structures, lists in python, iterating over lists in python, more on python lists
Dictionaries and sets: Dictionary type in python, Set data type
Functions: Program routines, more on functions

Unit 3 9

Module Design: Modules, Top-Down design, python modules
Text Files: Text File, Using Text files, string processing, exception handling

Unit 4 9

Objects and their usage: software objects
Introduction to Object oriented programming: class, three fundamental features of object oriented programming, encapsulation-what is encapsulation, defining classes in python.

Unit 5 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.

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. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle&Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.
4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle & Associates incorporated, independent publishers.
5. Learning Python, Mark Lutz, O'Reilly Publications 5th Edition

6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand computational problem solving and basic elements of python programming.	L1
2. Understand and apply python programming basic constructs like lists, dictionaries, sets and functions.	L1,L3
3. Illustrate module design and usage of text files in python programming	L3
4. Understand apply basics of object-oriented programming in python.	L1,L3
5. Understand and demonstrate elementary data structures.	L1,L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A521T.1	3	-	3	-	-	-	-	-	-	-	-	3
19A521T.2	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.3	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.4	3	-	3	3	-	-	-	-	-	-	-	3
19A521T.5	3	-	3	3	-	-	-	-	-	-	-	3

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

Title of the Course	Engineering Chemistry
Category	BS
Couse Code	19AC24T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 familiarize various sources of renewable energy and explain the construction of photovoltaic cells.
- To explain how to synthesize different polymers and differentiate polymers based on properties.
- To introduce different types of nano-materials, its instrumental techniques and compare molecular machines and molecular switches.

Unit 1 Electrochemical Energy Systems - I 9

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), Concentration Cells.

Unit 2 Electrochemical Energy Systems - Ii 9

Basic concepts, 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 cell

Unit 3 Energy Sources And Applications 9

Solar energy – Introduction - Physical and Chemical properties of Silicon- Production of Solar Grade Silicon from Quartz - Doping of Silicon- p and n type semi conductors- PV cell / solar cell- Manufacturing of Photovoltaic Cells using Chemical Vapor Deposition Technique-applications of solar energy.

Unit 4 Polymer Chemistry 9

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–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications.

Unit 5 Nanomaterials And Molecular Machines & Switches 9

Nanomaterials: Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method. Characterization: Principle and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM).

Molecular machines & Molecular switches: Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid-base controlled molecular shuttle, a molecular elevator, autonomous light-powered molecular motor, systems based on catenanes, molecular switches – introduction, cyclodextrin-based switches, in and out switching, back and forth switching.

Prescribed Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.

References Text Books:

1. O G Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, (2009)
2. Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
3. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
4. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010)
5. N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014).
6. K. SeshaMaheshwaramma and MridulaChugh, Engineering Chemistry, Pearson India Edn services, (2016)

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Enumerate different types of electrodes, electrochemical cells and their working	L1
2. Describe the constructing and working of different types of batteries and fuel cells	L2
3. Understand p and n type semiconductors and construction of PV cell	L2
4. explain the preparation, properties, mechanism of conduction and applications of different types of polymers	L4
5. explain the synthesis & analysis of different types of nanomaterials and compare molecular switches with molecular machines	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC24T.1	3	2	-	-	-	-	-	-	-	-	-	2
19AC24T.2	3	2	-	2	-	-	-	-	-	-	-	2
19AC24T.3	2	2	-	2	-	-	-	-	-	-	-	2
19AC24T.4	3	2	-	-	-	-	-	-	-	-	-	-
19AC24T.5	3	2	-	2	-	-	-	-	-	-	-	-

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

Title of the Course	Differential Equations and Vector Calculus
Category	BS
Couse Code	19AC21T
Year	I B.Tech
Semester	II Semester (Common to CE, EEE, ME, ECE & CSE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	1	-	4

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 9

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

Unit 2 Equations Reducible to Linear Differential Equations and Applications 9

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

Unit 3 Partial Differential Equations 9

Formation of PDEs by eliminating arbitrary constants and arbitrary functions-solutions of first order linear and non-linear PDEs using Charpits method-solutions of boundary value problems by using method of separation of variables.

Unit 4 Vector differentiation and integration 9

Scalar and vector point functions-vector operator del, del applies to scalar point functions-Gradient-del applied to vector point functions-Divergence and Curl-del applied twice to scalar point function-Line integral-circulation-work done-surface integral-flux-volume integral

Unit 5 Vector integral theorems 9

Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Divergence theorem (without proof)-Applications.

Prescribed Text Books

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

Reference Books

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.,2002
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Solve the differential equations related to various engineering fields.	L3
2. Formulate 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. Interpret the physical meaning of different operators such as gradient, curl and divergence and estimate the work done against a field, circulation and flux using vector calculus. L2
5. Evaluate double and triple integrals using Green's, Stoke's and Divergence theorem. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC21T.1	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.2	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.3	3	3	-	-	-	-	-	-	-	-	-	3
19AC21T.4	3	3	-	-	-	-	-	-	-	-	-	2
19AC21T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Electronic Devices and Circuits
Category	ES
Course Code	19A421T
Year	I B.Tech
Semester	II Semester (Common To EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:
- To understand the concepts of biasing and stabilization in BJT
- To understand the concepts of FET, MOSFET and their biasing techniques.
- To analyze the parameters like gain and impedances for single stage amplifier circuits.
- To understand the small signal analysis of FET Amplifiers.
- To understand the working principles of special purpose electronic devices.

Unit 1 Biasing & Stability 9

Overview of BJT Configurations, Transistor Amplifying Action – Load Line Analysis of AC & DC – Operating Point. Types of Biasing: Fixed Bias – Emitter Bias – Emitter Feedback Bias - Collector to Base bias – Voltage Divider Bias. Bias Stability: Need for Stabilization – Stabilization Factors (s,S',S'') – Stability Factors for Voltage Divider Bias - Thermal Stability and Thermal Runaway – Heat Sinks.

Unit 2 Field Effect Transistors & Its Biasing 9

Construction of JFETs – Transfer Characteristics – FET Biasing: Fixed Bias Configuration – Self Bias Configuration – Voltage Divider Biasing – Construction and Characteristics of MOSFETs – Depletion type MOSFETs – Enhancement type MOSFETs – Biasing in MOSFETs.

Unit 3 Single Stage Amplifiers 9

Single Stage Transistor Amplifier-How Transistor Amplifies- Graphical Demonstration of Transistor Amplifier- Practical Circuit of Transistor Amplifier-Phase Reversal- D.C. and A.C. Equivalent Circuits- Load line Analysis- A.C. emitter resistance-Formula for A.C. emitter resistance-Voltage gain in terms of A.C. emitter Resistance-Voltage gain-Classification of Amplifiers-Amplifier equivalent circuit-Equivalent circuit with signal source-Input impedance of and amplifier.

Unit 4 Amplifiers 9

Small signal model of JFET and MOSFET – Common source and common Drain amplifiers using FET.

Unit 5 Special Purpose Electronic Devices 10

Varactor Diode, Tunnel Diode, LED, PIN Diode, Schottky Diode, SCR, UJT, Photodiode, Phototransistor.

Prescribed Text Books:
1. Electronic Devices and Circuits, David A Bell, Fifth Edition, 2008, Oxford University Press.
2. Electronic Devices and Circuits, J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Text Books:
1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, 9th edition, PHI.
2. Principles of Electronics, V. K. Mehta, S. Chand Publications 2004
3. Integrated Electronics, Analog and Digital Circuits and Systems, J. Millman and Halkias, TMH.
4. Micro Electronic Circuits, Sedra and Smith, Oxford University Press

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand Biasing and Stabilization conditions of BJT.	L2
2. Understand Biasing and Stabilization conditions of FET.	L2
3. Design the amplifiers circuits under given requirements.	L5
4. Understand the Small signal model of FET.	L2
5. Have the knowledge and usage of special purpose electronic devices in various applications.	L1

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A421T.1	-	3	2	-	-	-	-	1	-	-	1	-	3	-	-
19A421T.2	-	3	3	-	1	-	-	2	-	-	1	-	3	-	-
19A421T.3	-	3	2	-	1	-	-	1	-	-	2	-	2	3	-
19A421T.4	-	3	2	-	1	-	-	1	-	-	2	-	2	-	-
19A421T.5	-	3	2	-	1	-	-	1	-	-	1	-	-	-	3

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

Title of the Course	Environmental Science
Category	MC
Course Code	19AC26T
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	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 save earth from the inventions by the engineers.
- 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 9

Definition, Scope and Importance – Need for Public Awareness. NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Use and over – exploitation, deforestation, dams and their effects on forest and tribal people – Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: Changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity – Land Resources: Land degradation, soil erosion - Energy resources: Renewable and non-renewable energy resources, use of alternate energy resources.

Unit 2 Ecosystems, Biodiversity, and its Conservation 9

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers –Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 3 Environmental Pollution and Solid Waste Management 9

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

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban waste – Role of an individual in prevention of pollution – Pollution case studies.

Unit 4 Social Issues and the Environment 9

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Water conservation, rain water harvesting, Environmental ethics: Issues and possible solutions –global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust – Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act.

Unit 5 Human Population and the Environment 9

HUMAN POPULATION AND THE ENVIRONMENT: Population explosion – Family Welfare Programmes – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

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

Prescribed Text Books:

1. Text book of Environmental Studies for undergraduate courses, Erach Bharucha for University Grant Commission, University press, New Delhi, 2004.
2. Environmental Studies, Palaniswamy, Second edition, Pearson education, New Delhi, 2014.

Prescribed Text Books:

1. Environmental Studies, Benny Joseph, Second edition, McGraw Hill Education (India) Private Limited, New Delhi, 2013
2. Environmental Studies from crisis to cure, R. Rajagopalan, Oxford University Press, New Delhi, 2015
3. Environmental Studies: A Text Book for Undergraduates, Dr. K. Mukkanti, S. Chand and Company Ltd, New Delhi, 2010
4. Ecology, Environmental Science and Conservation, J.S. Singh, S.P. Singh and S.R. Gupta, S. Chand and Company Ltd, New Delhi, 2014
5. A Text book of Environmental Studies, Shashi Chawla, Tata McGraw Hill Education, India, 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain how natural resources should be used.	L2
2. Identify the importance of protection of different ecosystems and biodiversity for future generations.	L3
3. List out the causes, effects and control measures of environmental pollution.	L1
4. Demonstrate knowledge to the society in the proper utilization of goods and services.	L2
5. 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
19AC26T.1	1	1	-	-	-	3	3	1	-	-	-	3
19AC26T.2	1	2	-	-	-	3	3	1	-	-	-	3
19AC26T.3	-	1	-	-	-	3	3	1	-	-	-	3
19AC26T.4	2	-	-	-	-	3	3	1	-	-	-	3
19AC26T.5	1	-	-	-	-	3	3	1	-	-	-	3

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

Title of the Course	Communicative English Lab
Category	HS
Couse Code	19AC25L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:
- Students will learn better English pronunciation
- Students will be trained to use language effectively in every day conversations
- Students will be trained to make formal oral presentations using effective strategies in professional life
- Students will be exposed to a variety of self-instructional, learner friendly modes of language learning

Pronunciation 6
Introduction to English speech sounds
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.

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

Reading 6
Information Transfer (Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/ relationships, communicate processes or display complicated data.

Minimum Requirement:
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 Text Book: 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
19AC25L.1	-	-	-	-	-	-	-	-	-	2	-	1
19AC25L.2	-	-	-	-	-	-	-	-	-	1	-	2
19AC25L.3	-	-	-	-	-	-	-	-	3	3	-	3
19AC25L.4	-	-	-	-	-	-	-	-	3	2	-	1
19AC25L.5	-	-	-	-	-	-	-	-	1	3	-	3
19AC25L.6	-	-	-	-	-	-	-	-	-	2	-	1

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

Title of the Course	Programming through Python Lab
Category	ES
Course Code	19A522L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:
- To practice basics of computational problem solving, 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 text files in python programming
- To practice basics of object oriented programming and elementary data structures.

List of Experiments
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. Implement python program on temperature conversion
5. Implement the python program to convert age in seconds.
6. Practice python programs on various types of triangle patterns
7. Implement python programs to find factorial and Fibonacci number using recursion
8. Practice python programs on lists
9. Practice python programs on sets and dictionaries
10. Practice python programs on functions and their implementation
11. Practice any one python program on module design
12. Practice python programs on text files, string processing
13. Practice python program on exception handling
14. Implement python programs on
    i) Stacks ii) Queues
15. Implement Single linked list data structure.

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

Reference Books:
1. Python Programming using problem solving approach, ReemaThareja, Oxford University press
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc., 3rd Edition
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O’Reilly Publications.
4. Problem solving with algorithms and data structures using python, Bradley Miller, David L.Ranum, Franklin, Beedle& Associates incorporated, independent publishers.
5. Learning Python, Mark Lutz, O’Reilly Publications 5th Edition

6. Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code Zed Shaw,Zed Shaw's Hard Way Series, Third Edition
7. Automate the Boring Stuff with Python: Practical Programming for Total Beginners, Al Sweigart, 1st Edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Use python basic concepts to develop problems to solve computational problems.	L3
2. Apply lists, dictionaries, sets and functions in python programming.	L3
3. Experiment module design and text files in python programming	L3
4. Solve problems using object-oriented concepts, elementary data structures in python programming	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A522L.1	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.2	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.3	-	-	3	3	3	-	-	-	-	-	-	-
19A522L.4	-	-	3	3	3	-	-	-	-	-	-	-

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

Title of the Course	Engineering Chemistry Lab
Category	BS
Course Code	19AC24L
Year	I B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

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

LIST OF EXPERIMENTS

Any TEN of the following experiments must be performed

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. Conduct metric 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 sulphuric acid in lead-acid storage cell
12. Preparation of TiO_2/ZnOnano particles
13. Determination of surface tension of a liquid
14. Preparation of Urea-Formaldehyde resin
15. SEM/TEM analysis of nano materials

Prescribed Text Books

1. Mendham J, Denney RC, Barnes JD, Thomas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain the functioning of instruments such as pH meter, conductivity meter and potentiometer.	L2
2. Estimate Zn, Cr, Fe & Cu and other metals in various compounds	L2
3. Determine physical properties of liquids	L4
4. Synthesize and characterize polymers and nano materials using SEM	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC24L.1	3	2	2	-	-	-	-	-	-	-	-	-
19AC24L.2	3	2	2	2	-	-	-	-	-	-	-	-
19AC24L.3	3	2	2	2	-	-	-	-	-	-	-	-
19AC24L.4	3	2	2	2	-	-	-	-	-	-	-	-

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

Title of the Course	Electronic Devices and Circuits Lab
Category	ES
Course Code	19A421L
Year	I B.Tech
Semester	II Semester (Common To EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:
- To determine characteristics of JFET, MOSFET, SCR and UJT.
- To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

List of the Experiments
1. Identification, Specifications and Testing of Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. JFET Characteristics.
3. MOSFET Characteristics
4. Frequency response of CE Amplifier.
5. Frequency response of CB Amplifier.
6. Frequency response of CC Amplifier.
7. Frequency response of Common Source FET Amplifier.
8. V-I Characteristics of LED.
9. SCR Characteristics.
10. UJT Characteristics.
11. Photodiode and Phototransistor Characteristics
12. Soldering Practice.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Gain the knowledge and practical usage of JFET, MOSFET and some special electronic devices.	L1
2. Design the amplifier circuits under given requirements.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A421L.1	2	2	1	-	-	-	-	-	-	-	-	1	-	-	3
19A421L.2	2	2	1	-	-	-	-	1	-	-	-	1	2	3	-

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

Title of the Course	Partial Differential Equations and Complex Variables
Category	BS
Course Code	19AC31T
Year	II B.Tech
Semester	I Semester
	(Common to CE, ME, EEE, ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the transform techniques and complex variables.
- To equip the students to solve application problems in their disciplines

Unit 1 Laplace transforms 9

Laplace transforms of standard functions- First shifting theorem- change of scale property- multiplication by t^n- division by t- transforms of derivatives and integrals- Laplace transform of Periodic functions. (Without proofs)

Unit 2 Inverse Laplace transforms 9

Inverse Laplace transforms – Convolution theorem. (Without proof).
Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

Unit 3 Fourier series 9

Fourier series- Dirichlet conditions- functions of any period-odd and even functions - half range series.

Unit 4 Applications of Partial Differential Equations 9

Method of separation of variables- second order partial differential equations- solutions of 1D-wave- 1D-heat and 2D-Laplace equations in Cartesian coordinates

Unit 5 Complex Variables 9

Differentiability-Analyticity -C-R equations (without proof) - harmonic functions- finding harmonic conjugate. Contour integrals- Cauchy's theorem (without proof) - Cauchy's integral formula-Generalized Cauchy's integral formula (without proof).

Prescribed Text Books

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2015.
Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

Reference Books

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the Laplace transformations for different types of functions.	L3
2. Apply the inverse Laplace transformations for different types of functions and solve ordinary differential equations by using Laplace transformation technique.	L3
3. Understand the nature of the Fourier series that represent even and odd functions	L2,
4. Solve the boundary value problems (related to heat, one dimensional wave equation)	L3

5. Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic and evaluate contour integrals. L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC31T.1	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.2	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.3	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.4	3	2	-	-	-	-	-	-	-	-	-	2
19AC31T.5	3	3	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Analog Electronics
Category	PC
Course Code	19A231T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
- Signal analysis using Op-amp based circuits.
- Applications of Op-amp.
- Functional blocks and the applications of special ICs like Timers, PLL circuits.
- A/D and D/A Converter.

Unit 1 Feedback Amplifiers and Oscillators 8
Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien Bridge, Hartley, Colpitts and Crystal oscillators.

Unit 2 Operational Amplifiers 10
Ideal OP-AMP characteristics, Internal Block diagram of op-amp, DC characteristics, AC characteristics, Basic op-amp applications, Instrumentation Amplifier, AC amplifier V/I & I/V converters, Differentiator, Integrator, Log and Antilog Amplifiers

Unit 3 Non Linear Applications of op-amp 9
Comparator, Multivibrators: Astable , Monostable and Schmitt Triggger, Triangle Waveform Generator, Op-amp circuits using Diodes, S/H circuit, Sine wave oscillators.

Unit 4 Filters and PLL 9
RC Active Filters: First order LPF & HPF, Second Order LPF & HPF, Band Pass Filter and Band Reject Filter, All pass Filter, IC 555 Timer and applications, Phase Locked Loop- Phase Detector, VCO, Monolithic PLL, Applications of PLL

Unit 5 D/A And A/D Converters 8
Introduction, Basic DAC Techniques: Weighted Resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Monolithic DAC, A/D Converters: Flash AC, Counter Type ADC, Servo Tracking ADC, Successive Approximation ADC, Dual Slope ADC, DAC/ADC specifications.

Prescribed Text Books:
1. David A. Bell , "Electronic devices and circuits", Oxford University higher education, 5th edition 2008.
2. 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press.
3. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.
Reference Books:
1. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the characteristics of Op-Amp.	L1, L4
2. Understand the importance of Signal analysis using Op-amp based circuits.	L1, L3
3. Functional blocks and the applications of special ICs like Timers, PLL circuits.	L1, L3
4. Understand and acquire knowledge on the Applications of Op-amp	L1, L3
5. Design and analysis of A/D and D/A Converter.	L1, L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
19A231T .1	2	3	2	2	1	1	-	-	2	1	-	2	2	-	-
19A231T .2	3	3	2	3	1	1	-	-	2	-	-	2	2	-	-
19A231T .3	2	2	2	1	1	-	-	-	2	-	-	2	2	-	-
19A231T .4	3	2	1	2	1	-	-	-	2	-	-	2	2	-	-
19A231T .5	2	3	3	2	2	1	-	-	2	1	-	2	2	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Circuit Theory
Category	PC
Course Code	19A232T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- Impart basic knowledge of the magnetic Circuits

Unit 1 Basic Concepts of Electrical Circuits 9

Voltage-Current Relationship for Passive Elements, Star-Delta Transformations, Voltage and Current division rules, Mesh, Super Mesh, Nodal and Super Node analysis

Unit 2 Fundamentals Of 1-Φ AC Circuits 9

Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions-Determination of Average, R.M.S Values, Peak and Form Factor for different Periodic Waveforms, Phase and Phase Difference, j-notation, Steady State Analysis of R, L and C with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Real and Reactive Power, Complex Power, Concept of Power Factor. Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems.

Unit 3 Three Phase Circuits 10

Phase Sequence - Star and Delta Connections-Relation between line, phase voltages and currents in balanced Systems - Analysis of balanced three Phase Circuits - Measurement of active and reactive power in balanced and unbalanced three phase systems - Analysis of three phase unbalanced circuits - Two wattmeter method of measurement of three phase power.

Unit 4 Network Theorems 10

Superposition-Thevenin's-Norton's-Maximum Power Transfer Theorem for AC Excitation, Millman's-Reciprocity-Substitution-Compensation and Tellegen's Theorems for DC and AC excitations and Dependent Sources.

Unit 5 : Magnetically Coupled Circuits & Network Topology 8

Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling-Analysis of Coupled Circuits
Network Topology: Basic Definitions- Graph- Tree, Incidence Matrix, Basic Cutset and Basic Tieset Matrices for Planar Networks –Problems.
Duality & Dual Networks-Problems.

Prescribed Text Books:

1. A. Sudhakar & Shyam Mohan s Palli. Circuits and Networks 5th Edition, Tata McGraw Edition(India) Private Limited, 2015.
2. A. Chakrabarti. Circuit Theory. 6th edition, Dhanpat Rai& Co, New Delhi, 2014.

Reference Books:

1. M.E. Van Valkenberg. Network Analysis. 3rd edition, Pearson Publications, New Delhi 2015.
2. William H. Hayt & Jack E. Kennedy & Steven M. Durbin. Engineering Circuit Analysis. 8th edition, TATA McGraw Hill Company, 2013.
3. J.A.Edminister & M.D.Nahvy. Theory and Problems of Electric Circuits. 4th Edition Schaums Outline series, New Delhi TATA McGraw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. Network Analysis. 14th Edition, Khanna Publishers, New Delhi, 1997

5. C. K. Alexander and M. N. O. Sadiku. Fundamentals of Electric Circuits. 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze electrical Circuits using network Reduction Techniques, Loop Analysis and Nodal Analysis.	L3
2. Analyze Single Phase AC Electrical Circuits	L3
3. Analyze 3-phase electrical circuits.	L3
4. Solve Electrical circuits using Theorems.	L3
5. Solve the Coupled Circuits.	L3
6. Apply concepts of electric network topology to solve electrical circuits.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A232T.1	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.2	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.5	3	3	3	-	-	-	-	-	-	-	-	-	3	-
19A232T.6	3	3	3	-	-	-	-	-	-	-	-	-	3	-

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

Title of the Course	Electrical Machines-I
Category	PC
Course Code	19A233T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives: This course will useful to the students to

- Understand the dc machine construction and operation.
- Characteristics of dc generators.
- Characteristics and speed control methods of dc motor.
- Construction and operation of single phase transformer.
- Differences between two winding transformer and auto transformer, poly phase transformers parallel operation.

Unit 1 Construction and Armature Reaction Of A DC Machine 8

DC Machines Constructional details, Principle of Operation as a generator and motor, armature windings-simplex lap and wave windings, EMF equation. Armature reaction and its effects – cross magnetizing and Demagnetizing AT/pole, Methods of improving commutation, numerical problems.

Unit 2 Types of DC Generators and Their Characteristics 9

Methods of excitation – separately excited and self-excited generators, buildup of EMF and causes for failure, open circuit characteristics – critical field resistance and critical speed, characteristics of separately excited and self-excited generators, numerical problems.

Unit 3 DC Motor Characteristics, Speed Control and Testing 8

Back emf, starters, torque equation, characteristics of dc motors, various applications of dc motor. Losses–constant and variable losses, efficiency, Speed control of dc motors-armature control, flux control, numerical problems
Testing of DC Machines
Direct (brake test), indirect (Swinburne 's test) and regenerative testing (Hopkinson's'test), Field's test, Retardation test, numerical problems.

Unit 4 Single Phase Transformers and its Testing 10

Construction, Operation on no-load and load, Equivalent circuit, phasor diagrams. Losses and efficiency, Regulation, Effect of variations of frequency & supply voltage on Iron losses.Testing of transformers -Open circuit and short circuit tests, Sumpner 's test, separation of losses test-numerical problems.

Unit 5 Parallel Operation of Transformers, Autotransformers And Poly Phase Transformers. 10

Parallel operation of single transformers. Autotransformers- equivalent circuit- comparison with two-winding transformers numerical problems.
Poly-phase Transformers -Poly-phase transformer connections, third harmonics in phase voltages, tertiary windings, Scott connection, numerical problems.

Prescribed Text Books:

1. P.S. Bimbhra (2009) —Electrical machinery, 7th Edition, Khanna Publishers.
2. I.J. Nagrath & D.P. Kothari, (2004), —Electric MachinesII, 3rd Edition, Tata McGraw-Hill Publishers.
3. A.E. Fitzgerald, C. Kingsley and S. Umans ,—Electric MachineryII, 6th Edition, Tata McGraw-Hill Companies, 2003

Reference Books:

1. H. Cotton, -Electrical Technology, 7th Edition, CBS Publishers, 2003.
2. Mukherjee and Chakravarthy, -Electrical Machines, 2nd Edition, Dhanpat Rai Publishers, 2001.

3. Ashfaq Hussain, ―Electrical MachinesII Second Edition, Dhanpat Rai Publishers.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the constructional aspects, operation and armature reaction of dc machine working of as a motor and generator.	L2
2. Analyze the performance characteristics of dc generator	L4
3. Analyze the methods of speed control, testing of DC motor and its characteristics.	L4
4. Understand the operation of a single-phase transformer and its testing.	L2
5. Understand the differences between auto transformer, two winding transformer and poly phase transformers.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A233T.1	1	1	-	1	-	-	-	-	-	-	-	1	-	-
19A233T.2	2	2	-	2	2	2	-	-	-	-	-	2	-	-
19A233T.3	2	2	2	2	2	2	-	-	-	-	-	2	-	-
19A233T.4	1	1	1	1	-	-	-	-	-	-	-	1	-	-
19A233T.5	1	1	-	1	-	-	-	-	-	-	-	1	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Switching Theory and Logic Design
Category	PC
Course Code	19A234T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To understand the concepts and techniques associated with the number systems and codes
- To minimize the logical expressions using Boolean postulates
- To design various combinational and sequential circuits.

Unit 1 Number Systems, Codes & Boolean Algebra 9

Philosophy of number systems – r, (r-1)'s complement, representation of negative numbers, Binary arithmetic, Binary codes, Error detecting &Error correcting codes, hamming code.
Boolean Algebra: Fundamental postulates of Boolean algebra, Basic theorems and Properties, Logic gates, Properties of XOR gate, universal gates.

Unit 2 Switching Functions and Their Minimization 8

Switching Functions-Canonical and Standard forms, Algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.
Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, simplification rules.

Unit 3 Combinational Logic Design & Programmable Logic Devices: 10

Design using conventional logic gates-Binary Adders, Subtractors, Ripple Adder, Look Ahead carry adder, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, Code-converters.
PLD's: ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's. Comparison between PLA, PAL, ROM.

Unit 4 Sequential Circuits 8

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples),Basic flip-flops, Triggering and excitation tables, flip flop conversions, Steps in synchronous sequential circuit design, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter.

Unit 5 FSM Minimization and ASM Charts 10

Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified sequential machines, Partition technique.
Algorithmic State Machines: Salient features of the ASM chart.

Prescribed Text Books:

1. M.Morris Mano, Digital Design. Pearson,5th Ed,2013.
2. A.Anand Kumar, Switching Theory and Logic Design.3rd Edition, PHI Learning Pvt. Ltd., 2016.

Reference Books:

1. ZviKohavi, Switching& Finite Automata Theory. TMH, 2nd Edition,2008.
2. Charles H. Roth,Jr, Larry L.Kinney.Fundamentals of Logic Design. Cengage Learning, 2015, 6th Ed.
3. William I. Fletcher, An Engineering Approach to Digital Design. Pearson, 3rd Ed, 2015.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the number systems and codes.	L4
2. Simplify the logics expressions using Boolean laws and postulates.	L1
3. Minimize the logic expressions using map method and tabular method.	L3
4. Design combinational logic circuits using conventional logic gates and various programmable logic devices.	L5
5. Design sequential logic circuits and Finite state machines.	L5

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A234T.1	2	2	2	-	2	2	-	-	-	-	-	2	2	2
19A234T.2	3	3	3	-	3	-	-	-	-	-	-	3	3	3
19A234T.3	3	3	3	-	3	3	-	-	-	-	-	3	3	3
19A234T.4	3	3	3	3	3	3	-	-	-	-	-	3	3	3
19A234T.5	3	3	3	3	-	-	-	-	-	-	-	3	3	3

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

Title of the Course	Fluid Mechanics and Hydraulic Machinery
Category	ES
Course Code	19A337T
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	1	-	3

Course Objectives:

- To give insight knowledge on fluid statics and kinematics
- To gain knowledge on fluid dynamics
- To give basic understanding of Hydro Electric power plant and importance of impact of jets
- To become familiar about different types of turbines and able to analyze the performance characteristics of various turbines.
- To be able to understand the working of power absorbing devices like pumps and able to analyze their performance characteristics.

Unit 1 Fluid Statics 7

Dimensions and units: physical properties of fluids- specific gravity, viscosity, surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure Piezometer, U-tube and differential manometers – Buoyancy, meta-centre, metacentre height, condition of equilibrium height of a floating and submerged bodies.

FLUID KINEMATICS: Stream line, path line, streak lines and stream tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows. Equation of continuity for one dimensional flow

Unit 2 Fluid Dynamics 7

Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend. CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: Pitot tube, venture meter and orifice meter.

Unit 3 Hydroelectric Power Stations 10

Elements of hydro electric power station-types. Concept of pumped storage plants- storage requirements. BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

Unit 4 Hydraulic Turbines 12

Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency. PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

Unit 5 Centrifugal Pumps 7

Classification, working, work done – manometric headlosses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH. RECIPROCATING PUMPS:Working, Discharge, slip, indicator diagrams.

Prescribed Text Books:

1. Fluid Mechanics and Hydraulic machines by Dr. R.K.Bansal
2. Hydraulics and Fluid Mechanics including Hydraulic Machines by Dr. P.N.Modi and Dr. S.M.Seth

Reference Books:

1. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering.Kotaria & Sons – 2013 edition.
2. D. Rama Durgaiah, Fluid Mechanics and Machinery. New Age International, 1st edition – 2002
3. Banga& Sharma, Hydraulic Machines.Khanna Publishers.
4. James W. Dally, William E. Riley, Instrumentation for Engineering Measurements. John Wiley & Sons Inc, 2nd edition – 2010.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Gain the knowledge on fluid mechanics fundamentals like fluid statics and fluid kinematics	L1,L2
2. Have basic idea about the fundamental equations used in Fluid Dynamics and are able to apply these concepts in real working environment	L2,L3
3. Study the fundamentals of turbo machinery and elements of hydroelectric power plant	L2,L3
4. Measure the performance of the different types of Hydraulic Turbines	L2,L3,L4
5. Calculate the performance of the different types of Hydraulic Pump	L2,L3,L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A337T.1	3	3	3	-	3	-	3	-	-	-	-	-
19A337T.2	3	3	3	-	3	-	3	-	-	-	-	-
19A337T.3	3	3	3	3	-	3	3	-	-	1	-	-
19A337T.4	3	3	3	3	3	3	3	-	2	-	-	-
19A337T.5	3	3	3	3	3	3	3	-	2	-	-	-

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

Title of the Course	Essence of Indian Traditional Knowledge
Category	MC
Course Code	19AC35T
Year	II B.Tech
Semester	I Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	0

Course Objectives:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- To focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection

Unit 1 9

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems.

Unit 2 9

Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Unit 3 9

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK, Protection, value of TK in global economy, Role of Government to harness TK.

Unit 4 9

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Unit 5 9

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Prescribed Text Books

1. Traditional Knowledge System in India, by Amit Jha, 2009.

Reference Books

1. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012
2. Knowledge Traditions and Practices of India, Kapil Kapoor, Michel Danino

e-resources: https://www.youtube.com/watch?v=LZP1StpYEPM

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the concept of Traditional knowledge and its importance	L2
2. Understand the need and importance of protecting traditional knowledge and apply it in daily lives	L2
3. Apply various enactments related to the protection of traditional knowledge.	L1
4. Understand the concepts of Intellectual property to protect the traditional knowledge	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC35T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC35T.4	-	-	-	-	-	-	-	-	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Fluid Mechanics and Hydraulic Machinery Lab
Category	ES
Course Code	19A337L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- To provide knowledge in verifying Bernoulli's Theorem.
- To impart knowledge in Fluid flow devices like Venturi meter & Orifice meter
- To understand frictional losses in pipes with various diameters.
- To acquire knowledge about various hydraulic Machines like Centrifugal pump, Reciprocating pump, Pelton Turbine, Kaplan Turbine, Francis Turbine etc.
- To understand impact of jet on vanes like Flat vane & semi-circular vane
- To develop the students in learning the various principles of Fluid Mechanics & Hydraulic Machines, so that they can characterize, transform and use the knowledge gained in solving the various related Engineering problems.

LIST OF EXPERIMENTS Practice hours: 20

1. Impact of jet on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.
13. Verification of Bernoulli's theorem.

Note: Any 10 of the above 13 experiments are to be conducted.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Verify the Bernoulli's Theorem	L3
2. Measure the flow rate of fluids by the instruments like Venturimeter and Orifice meter.	L3
3. Analyze the frictional losses and discharge in pipes.	L3
4. Analyze impact of jet on vanes like Flat vane & Semi circular vane.	L3
5. Conduct experiments, analyze the data and interpret results of hydraulic machineries.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19A337L.1	3	-	2	-	-	-	-	-	-	-	-	-
19A337L.2	2	1			-	-	-	-	-	-	-	-
19A337L.3	2	1	1	-	-	-	-	-	-	-	-	-
19A337L.4	2	1	2	-	-	-	-	-	-	-	-	-
19A337L.5	3	2	3	2	-	-	-	-	-	-	-	-

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

Title of the Course	Analog Electronics Lab
Category	PC
Course Code	19A231L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- Aims to make the students be able to design electronic circuits
- To understand the analysis of transistor-based amplifiers
- To generate different types of non-sinusoidal signals
- To verify the applications of Op-Amp

Perform the following experiments

1. Feedback amplifier (Current Series & Voltage Series)
2. Linear wave shaping
3. Class A power amplifier
4. Class B power amplifier
5. Non-linear wave shaping –Clippers
6. Non-linear wave shaping- Clampers
7. Op-Amp applications- adder and subtractor circuits
8. Active filter applications- LPF, HPF (first order)
9. Function generator using Op-Amps
10. IC-555 timer- Monostable and Astable Operation circuit
11. 4-Bit DAC using Op-Amp

Prescribed Text Books:

1. David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008. 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press
2. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

Reference Books:

1. RamakantA.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI. 2000.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the characteristics of Op-Amp.	L4
2. Understand the importance of Signal analysis using Op-amp based circuits.	L3
3. Functional blocks and the applications of special ICs like Timers, PLL circuits.	L3
4. Understand and acquire knowledge on the Applications of Op-amp	L3
5. Ability to design and analysis of A/D and D/A Converter.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A231L.1	2	3	2	2	2	-	-	2	-	-	-	-	3	-
19A231L.2	2	3	2	-	3	-	-	2	-	1	-	-	2	-
19A231L.3	2	1	1	-	2	-	-	-	-	1	-	-	2	1
19A231L.4	2	3	3	2	2	-	-	-	2	-	-	-	2	-
19A231L.5	2	3	2	2	-	-	-	2	-	-	-	-	2	-

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

Title of the Course	Electrical Machines –I Lab
Category	PC
Course Code	19A233L
Year	II B.Tech
Semester	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	2	1

Course Objectives:

- Speed control and performance characteristics of DC Machines; determination of losses in a DC machine.

List of Experiments
Perform any ten in the following Experiments
1. Magnetization characteristic of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator (cumulative and differential connections).
5. Hopkinson's test.
6. Field's test.
7. Swinburne's test.
8. Speed control of DC shunt motor.
9. Brake test on DC compound motor.
10. Brake test on DC shunt motor.
11. Brake test on DC series motor.
12. Separation of losses in DC shunt machine.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Identify various parts of DC machine and different types of Starters.	L1
2. Analyze the performance of various DC machines.	L4
3. Design the experimental circuit based on loading and rating of The DC machine.	L4
4. Demonstrate skills in • Obtaining various characteristics of DC machines. • Determining the performance of DC machines. • Determining and separating losses in DC machines.	L3
5. Function effectively as individual and as member in a team.	L4
6. Communicate effectively both oral and written.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A233L.1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
19A233L.2	2	3	-	-	-	-	-	-	-	-	-	-	3	-
19A233L.3	1	2	3	-	-	-	-	-	-	-	-	-	3	-
19A233L.4	2	2	2	3	-	-	-	-	-	-	-	-	-	3
19A233L.5	1	2	-	-	3	-	-	-	-	-	-	-	-	3
19A233L.6	1	-	-	-	-	3	-	-	-	-	-	-	-	

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

Title of the Course	Numerical Methods and Transform Techniques
Category	BS
Course Code	19AC42T
Year	II B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To familiarize the students with numerical methods of solving.
- To familiarize the complex variables and transform techniques.

Unit 1 Solutions of algebraic, transcendental equations and Interpolation 9

Solutions of algebraic and transcendental equations: Bisection method – Regular Falsi method and Newton-Raphson method. Interpolation: Finite differences - forward differences and backward differences - Newton's forward interpolation formula and Newton's backward interpolation formula - Lagrange's interpolation formula.

Unit 2 Numerical Differentiation and Numerical Solutions of ordinary differential equations of first order 9

Numerical Differentiation: Numerical integration- Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.
Numerical Solutions of ordinary differential equations of first order: Taylor's series, Modified Euler's method - Runge-Kutta method of fourth order.

Unit 3 Complex Power Series and Residues 9

Complex variables-Taylor's series - zeros of analytic functions – singularities - Laurent's series - Residues- Cauchy residue theorem (without proofs).

Unit 4 Fourier Transforms 9

Fourier integrals - Fourier cosine and sine integrals - Fourier transform - sine and cosine transform – properties.

Unit 5 Z-Transforms 9

Definition of Z-transform - elementary properties - linearity property - damping rule - shifting u_n to the right and left - multiplication by n - initial value theorem - final value theorem - inverse Z-transform - convolution

Prescribed Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

Reference Books

1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley
2. India, 2009.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, McGraw Hill, 2004.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply the knowledge of numerical methods to solve algebraic and transcendental equations and acquire the knowledge of interpretation.	L3
2. Understand the technics of numerical differentiation, Integration and numerical solution of ordinary differential equations.	L2
3. Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.	L3
4. Apply the knowledge of Fourier Integrals and Fourier transformation to solve differential equations.	L3
5. Develop Z-transforms Techniques for discrete time systems.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC42T.1	3	3	-	-	-	-	-	-	-	-	-	3
19AC42T.2	3	3	-	-	-	-	-	-	-	-	-	2
19AC42T.3	3	3	-	-	-	-	-	-	-	-	-	2
19AC42T.4	3	3	-	-	-	-	-	-	-	-	-	3
19AC42T.5	3	3	-	-	-	-	-	-	-	-	-	2

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

Title of the Course	Electrical Machines -II
Category	PC
Course Code	19A241T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To impart knowledge on construction and operational aspects of various types of Induction machines & Synchronous Machines, single phase machines & Special machines.
- To develop skills in analyzing and evaluating the operation and performance of Induction machines, Synchronous Machines, single phase machines & Special machines for various operating conditions.
- To inculcate attitude of applying the conceptual knowledge of Induction machines, Synchronous Machines, single phase machines & Special machines to meet the societal needs.

Unit 1 Basics of Three phase rotating machines & 3-phase induction motor 10

Basics of Three phase rotating machines: Constructional features, principle of working of 3-phase induction motor and synchronous machine, Armature windings, integral slot and fractional slot windings, Distributed, concentrated and chorded windings, distribution, pitch and windings factors.

3-phase induction motor: Rotor input, losses and power flow diagram, torque equation, expressions for maximum torque and starting torque, torque - slip characteristics, crawling and cogging, double-cage and deep-bar rotors, circle diagram & predetermination of performance, numerical problems.

Unit 2 Starting of three phase induction motor & Speed control of Induction motors 10

Starting of three phase induction motor :Starting methods: direct online starting, stator reactor starting, autotransformer starting, star-delta starting and starting current and starting torque calculations, numerical problems.

Speed control of Induction motors: Speed control – change of frequency, change of poles– cascade connections, rotor resistance method, injection of an emf into rotor circuit (qualitative treatment only), induction generator (qualitative treatment only), numerical problems

Unit 3 1-phase Induction motors 8

1-phase Induction motors: Principle of working, determination of equivalent circuit parameters – numerical problems. Starting methods and types - split-phase induction motors, capacitor motors, capacitor start motors, two value capacitor motors, permanent split capacitor (PSC) motor, and shaded pole induction motor.

Unit 4 Synchronous Machines & Regulation of Alternators 8

Synchronous Machines: EMF equation, Harmonics in generated emf, slot harmonics and suppression of harmonics, Armature reaction, numerical problems.

Regulation of Alternators: Regulation of Alternators: Regulation of alternator by synchronous impedance method, M.M.F. method and Z.P.F method, two reaction analysis, experimental determination of X_d and X_q, phasor diagrams, regulation of salient pole alternators, numerical problems.

Unit 5 Parallel operation of Alternators & Synchronous motors 9

Parallel operation of Alternators: Synchronization of alternators with infinite bus bars, synchronizing power, parallel operation and load sharing, effect of change of excitation and mechanical power input, numerical problems.

Synchronous motors: Theory of operation, phasor diagram, synchronous condenser, numerical problems. Hunting and its suppression, methods of starting, numerical problems.

Prescribed Text Books:

1. P.S. Bimbhra, ―Electrical machinery, 7th Edition, Khanna Publishers, 2011.
2. I.J. Nagrath& D.P. Kothari, ―Electric Machines,5th Edition, Tata McGrawhill Publishers,2017.
3. A.E. Fitzgerald, C. Kingsley and S. Umans , ―Electric Machinery, 6th Edition, Tata McGrawHill Companies, 2003.
4. P.S. Bimbhra, ―Generalized Theory of Electrical machinesǁ, 6th Edition, Khanna Publishers, 2002.

Reference Books:

1. H. Cotton, ―Electrical Technologyǁ, 7th Edition, CBS Publishers, 2003
2. Mukherjee and Chakravarthy, ―Electrical Machinesǁ, 2nd Edition, Dhanpat Rai Publishers,2001.
3. Ashfaq Hussain, ―Electrical Machinesǁ Second Edition, Dhanpat Rai Publishers.
4. M. G. Say, ― The Performance and Design of Alternating Current Machinesǁ, CBS Publishers & Distributers PVT. Ltd., New Delhi, 2005.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Demonstrate knowledge on • Construction, operation of Induction machines, Synchronous machine, fractional kilowatt motors.. • Characteristics of induction motors. • Starting and speed control of induction motors. • Armature reaction, regulation and synchronization of alternator. • Starting methods of synchronous motor. • Parallel operation of alternators.	L1
2. Analyze the operation and performance of Induction machines, synchronous and single phase machines for various operating conditions.	L4
3. Design suitable accessories / techniques for the starting and speed control of induction motors.	L3
4. Solve engineering problems pertaining for induction machines synchronous machines and fractional kW motors to provide feasible solutions.	L3
5. Select appropriate techniques and tools for desired operation of induction machines, of synchronous and fractional kW machines in domestic, agriculture and industrial applications.	L4
6. Apply the conceptual knowledge of Induction Machines, synchronous machines, fractional kW motors in relevance to industry and society.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A241T.1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
19A241T.2	2	3	-	-	-	-	-	-	-	-	-	3	3	-
19A241T.3	1	2	3	-	-	-	-	-	-	-	-	2	3	-
19A241T.4	2	2	2	3	-	-	-	-	-	-	-	1	-	3
19A241T.5	1	2	-	-	3	-	-	-	-	-	-	2	-	3
19A241T.6	1	-	-	-	-	3	-	-	-	-	-	1	-	-

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

Title of the Course	Electromagnetic Fields
Category	PC
Course Code	19A242T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.

Unit 1 Electrostatics-I 10

Electrostatic fields-Coulomb's law - Electric Field Intensity (EFI) - Various Charge Distributions - EFI due to a Continuous charge distributions- Infinite line and Infinite surface charge- Electric Flux density-Gauss's Law - Applications of Gauss law to symmetrical charge distributions(Point, Infinite line and Infinite surface Distributions) and differential volume element - Maxwell's first equation. Energy expended in moving a point charge in an electric field-Potential –Maxwell's second equation

Unit 2 Electrostatics-II 10

Potential Gradient-Potential for different Charge distributions-energy density in electrostatic fields Electric Dipole-Dipole moment - potential and EFI due to an electrical Dipole-Torque on an Electric Dipole in an electric field-Current density - conduction and convection current density - Polarization , Boundary Conditions Capacitance-capacitance of parallel plate, Spherical and Co-axial capacitors with composite dielectric Laplace's and Poisson's equations.

Unit 3 Magnetostatics-I 10

Static magnetic fields-Biot-Savart's law, Magnetic Field Intensity(MFI) - MFI due to a straight current carrying filament, Circular, Solenoid current carrying wire, Relation between magnetic flux, Magnetic flux density and MFI. Ampere's Circuital law - Maxwell's third equation- Applications of Ampere's law to infinite line current, Infinite sheet of current, Infinitely long co-axial transmission line, Scalar magnetic potential and its limitations-Vector magnetic potential, Maxwell's fourth equation.

Unit 4 Magnetostatics-II 10

Magnetic Forces- Force on moving charges, - Lorentz force equation, Force on a current element -Force on a straight and long current carrying conductor in magnetic field-Force between two straight long and parallel current carrying conductors. Magnetic Dipole and Dipole moment - Torque on a current loop placed in a magnetic field. -Magnetization - Self-Inductance of a solenoid, Co-axial cable, energy stored and density in magnetic field.

Unit 5 Electrodynamic Fields 9

Time varying fields - Faraday's laws of electromagnetic induction -statically and dynamically induced EMF – simple problems. Modifications of Maxwell's equations for time varying fields(Point forms and Integral forms) - displacement current - pointing theorem and pointing vector

Prescribed Text Books:

1. Matthew N.O. Sadiku. Principles of Electromagnetic Fields. 6thedition, Oxford Publications, Jan' 2018
2. William H. Hayt& John A. Buck. Engineering Electromagnetics. 8th Edition, Mc. Graw Hill Companies, Sep'2017.

Reference Books:

1. Joseph A .Edminister ,Theory and problems of Electromagnetics 4th Edition ,Schaum's Outline series Mc.Graw Hill companies ,New Delhi,2009.
2. A. Gangadhar& P.M. Ramanathan. Field Theory. 5th edition, Khanna publishers, New Delhi, 2008.
3. Ashutosh Pramanik. Electromagnetism ,Problems with solutions. 3rd Edition.PHI

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the different aspects related to Static Electric Fields and corresponding Maxwell's equations.	L3
2. Understand the significance of Polarization and Capacitance in Static Electric Fields.	L1
3. Analyze the different aspects related to Static Magnetic Fields and corresponding Maxwell's equations.	L3
4. Learns the significance of Magnetization and Inductance in Static Magnetic Fields.	L1
5. Demonstrate the physical significance of Time Varying Electromagnetic Fields through corresponding Maxwell's equations.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A242T .1	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .2	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .3	3	3	-	-	-	-	-	-	-	-	-	-	1	-
19A242T .4	3	3	-	-	-	-	3	-	-	-	-	-	-	1
19A242T .5	2	2	-	-	-	-	-	-	-	-	-	-	-	1

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

Title of the Course	Generation and Transmission of Electric Power
Category	PC
Course Code	19A243T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:

- Understand the operation of conventional power plants.
- Understand the electrical design of transmission lines.
- Evaluate the performances of transmission lines.
- Understand the mechanical design of transmission lines.
- Understand the basic concepts of distribution system and underground cables.

Unit 1 Conventional Power Generation Plants 9

Line diagrams of Thermal Power Station, Hydro power station, Gas and nuclear Power stations. Advantages and disadvantages of the plants. Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Unit 2 Transmission Line Parameters 10

Electrical design of Overhead Transmission Lines – Calculation of Line constants of 1- phase, 3-phase system of symmetrical, unsymmetrical and transposed configurations –Calculation of Line constants of stranded conductor, double circuit 3-phase system using GMD and GMR Concepts.

Unit 3 Performance of Transmission Lines 10

Classification of Transmission Lines -Short, medium and long line and their model representations - Nominal-T, Nominal-π and A, B, C, D Constants for symmetrical networks, Numerical Problems and solutions for estimating regulation and efficiency of all types of lines. – Numerical Problems.

Unit 4 Performance of Factors affecting the Transmission line 8

Skin and Proximity effects, Ferranti effect, Charging Current - Corona - factors affecting corona, critical voltages and power loss.

Overhead Line Insulators, Types of Insulators, String efficiency and Methods for improvement, voltage distribution, calculation of string efficiency, Numerical Problems.

Sag and Tension Calculations: Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Stringing chart, Numerical Problems.

Unit 5 Underground Cables 9

Types of Cables, Construction, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables, Capacitance grading, Inter-sheath grading, Numerical Problems.

Prescribed Text Books:

1. M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, -A Text Book on Power System Engineeringǁ, Dhanpat Rai & Co Pvt. Ltd. 1999.
2. C.L.Wadhwa, -Electrical Power Systemsǁ, New Age International (P) Limited, Publishers, 1998.
3. V.K Mehta and Rohit Mehta (2004), -Principles of Power Systemsǁ, S.Chand & Company, New Delhi.
4. Dr.B.R.Gupta , -Generation of Electric Energyǁ, 6th edition, 2008, S.Chand Publisher.

Reference Books:

1. John J Grainger William D Stevenson, ―Power system Analysisǁ, TMC Companies, 4th edition, 2004
2. Hadi Saadat, ―Power System Analysisǁ, TMH Edition. 2002.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Describe the different types of conventional power generation plants.	L1
2. Demonstrate knowledge on transmission line parameters and configurations.	L2
3. Analyze the voltage drop, power loss and efficiency in transmission systems.	L4
4. Identify appropriate model for transmission system while exercising modeling and planning of power system.	L3
5. Evaluate parameters for transmission lines and underground cables.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A243T .1	-	-	3	-	-	3	3	-	-	-	-	-	-	3
19A243T .2	3	3	2	-	-	-	-	-	-	-	-	2	3	2
19A243T .3	3	3	-	1	-	2	-	-	-	-	-	2	3	
19A243T .4	3	3	2	-	2	2	1	-	-	-	-	2	3	2
19A243T .5	3	3	2	-	2	2	1	-	-	-	-	2	3	2

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

Title of the Course	Linear Control Systems
Category	PC
Course Code	19A244T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
To provide an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools.

Unit 1 Introduction 10
Concepts of Control Systems- Open Loop and closed loop control systems Examples, Effects of feedback-Mathematical models-differential Equations-Transfer Function-Mechanical Translational & Rotational systems, Electrical analogy — Block Diagram representation of systems - Block diagram algebra, Signal Flow graph and Mason's gain formula. Transfer function of DC servo motor – AC servo motor-Synchro transmitter and receiver.

Unit 2 Time Response Analysis 8
Types of test signals, Type and Order of a systems, Time Response of first-second order system, Time domain specifications- and– steady state error – static error constants – generalized error coefficients, Effects of proportional, integral, derivative Controllers.

Unit 3 Stability Analysis in Time Domain 9
Concepts of stability- BIBO Stability, Characteristic equation, location of roots in s-plane for stability, Routh-Hurwitz stability criterion- Root locus concept - construction of root locus.

Unit 4 Frequency Response Analysis 9
Introduction, Frequency domain specifications-Bode Diagrams, Stability Analysis from Bode Plots, Stability analysis from Polar plots, Stability analysis from Nyquist plots.

Unit 5 Compensation Techniques & State Space Analysis 9
Compensation techniques – Lag, Lead, Lead-Lag Compensators design using Bode Plot
Concepts of state, state variables and state model, obtaining of state model from physical systems and transfer function, obtaining transfer function from state space, State Transition Matrix and its properties–Determination of controllability and Observability using Kalman's test

Prescribed Text Books:

1. Katsuhiko Ogata "Modern Control Engineering" — Prentice Hall of India Pvt. Ltd., 5th edition,2010
2. I.J.Nagrath and M. Gopal "Control Systems Engineering" New Age International (P) Limited, Publishers, 5th edition,2007.

Reference Books:

1. Control Systems Engineering - by NISE 5th Edition – John Wiley& sons, 2010.
2. Control Systems –by A. NagoorKani– First Edition RBA Publications, 2006.
3. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi John Wiley and sons, 8th edition,2003.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the basic components of control systems.	L2
2. Gain knowledge in various time domain and frequency domain tools for analysis and design of linear control systems and compensators.	L1
3. Understand the methods to analyze the stability of systems from transfer function forms.	L2
4. Understand the concept of state variable analysis.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A244T.1	2	2	2	-	2	-	-	-	-	-	-	-	3	-
19A244T.2	3	3	3	-	2	-	-	-	-	-	3	3	3	3
19A244T.3	1	1	1	-	2	-	-	-	-	-	-	-	3	-
19A244T.4	1	1	1	-	2	-	-	-	-	-	3	3	3	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Network Analysis and Synthesis
Category	PC
Course Code	19A245T
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	3

Course Objectives:
This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of two port network, transient analysis, applications of Laplace and Fourier transforms, network function and network synthesis techniques etc.

Unit 1 Two Port Networks 8
Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Condition for Reciprocity and Symmetry-inter connections- Two Port Network Parameters using Transformed Variables.

Unit 2 Laplace Transforms 9
Definition of Laplace transform – advantages - Laplace transform of standard and Delay functions –properties of Laplace transforms– inverse Laplace transform - application of Laplace transform to series RL, RC, RLC circuits – initial and final value theorem

Unit 3 Transient Analysis (AC & DC) 9
DC Transient response of RL, RC and RLC series circuits –Initial Conditions- Response of RL, RC and RLC series circuits with AC excitation

Unit 4 Fourier Series & Fourier Transforms 9
Introduction- trigonometric Fourier series - evaluation of Fourier coefficients – waveform symmetry, exponential form of Fourier series, effective value, Fourier transforms & Properties.

Unit 5 Network Functions and Synthesis 10
Network functions- necessary conditions for driving point function-necessary conditions for transfer function – Hurwitz polynomials – positive Real functions - definitions and properties - synthesis of single port networks (RL, RC and LC networks).

Prescribed Text Books:
1. A. Sudhakar & Shyam Mohan s Palli. Circuits and Networks 5th Edition, Tata McGraw Edition (India) Private Limited, 2015.
2. D. Roy Choudhury. Networks and Systems. 1st edition, New Age international publishers
Reference Books:
1. A.Chakrabarthi. Circuit Theory (Analysis and Synthesis). 1st edition
2. M.E. Van Valkenburg. Network analysis. 3rd edition
3. William H Hayt Jr. Jack E. Kemmerly, Steven M. Durbin. Engineering Circuit Analysis. 6th edition, Tata Mcgraw Hill publishing company Ltd.,
4. Umesh Sinha. Network Analysis and Synthesis. 5th edition, Satyaprakashan, New Delhi.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Calculate two port Network parameters.	L3
2. Analyze the electrical circuits using Laplace Transforms.	L3
3. Analyze the transient response of electrical circuits for DC and AC excitations.	L3
4. Analyze the electrical circuits using Fourier series and Fourier transforms.	L3
5. Synthesize the Network functions.	L3

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A245T.1	3	3	3	3	-	-	-	-	-	-	-	-	3	-
19A245T.2	3	3	-	-	3	-	-	-	3	-	-	-	2	-
19A245T.3	3	3	3	-	-	3	-	-	-	-	-	-	2	1
19A245T.4	2	2	2	-	-	-	-	-	-	-	-	-	2	-
19A245T.5	1	1	-	1	-	-	-	-	-	-	-	-	2	-

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

Title of the Course	Life Sciences for Engineers
Category	BS
Course Code	19AC44T
Year	II B.Tech
Semester	II Semester (Common to EEE & ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
2	-	-	2

Course Objectives:

- Introduce the molecular basis of life.
- Provide the basis for classification of living organisms.
- Describe the transfer of genetic information.
- Introduce the techniques used for modification of living organisms.
- Describe the applications of biomaterials

Unit 1 Living Organisms 9

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

Unit 2 Proteins and Enzymes 9

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

Unit 3 Human Physiology 9

Bioenergetics, Respiration: Glycolysis and TCA cycle, Electron transport chain and oxidative phosphorylation, Mechanism of photosynthesis, Human physiology, neurons, synaptic and neuromuscular junctions

Unit 4 Genes and DNA 9

Mendel's laws, gene mapping, Mitosis and Meiosis, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation

Unit 5 RNA 9

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

Prescribed Text Books

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011

Reference Books

1. Alberts Et.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Explain catalytic properties of enzymes.	L2
2. Summarize application of enzymes and fermentation in industry.	L2
3. Identify DNA as a genetic material in the molecular basis of information transfer.	L2
4. Apply thermodynamic principles to biological systems.	L2
5. Analyze biological processes at the reductionistic level.	L4

6. Identify the potential of recombinant DNA technology. L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC44T .1												
19AC44T .2												
19AC44T .3												
19AC44T .4												
19AC44T .5												
19AC44T .6												

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

Title of the Course	Constitution of India
Category	MC
Course Code	19AC47T
Year	II B.Tech
Semester	II Semester (Common to EEE and ECE)

Lecture Hours	Tutorial Hours	Practical	Credits
3	-	-	0

Course Objectives:

- To enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative

Unit 1 9

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Unit 2 9

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions

Unit 3 9

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit 4 9

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Unit 5 9

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Prescribed Text Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust

Reference Books

1. J.A. Siwach, Dynamics of Indian Government & Politics
2. D.C. Gupta, Indian Government and Politics
3. M.V. Pylee, India's Constitution

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand historical background of the constitution making and its importance for building a democratic India.	L2
2. Understand the functioning of three wings of the government i.e., executive, legislative and Judiciary.	L2
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.	L2
4. Analyze the decentralization of power between central, state and local self-government.	L3
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
19AC47T.1	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.2	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.3	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.4	-	-	-	-	-	-	-	-	-	-	-	3
19AC47T.5	-	-	-	-	-	-	-	-	-	-	-	3

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

Title of the Course	Electrical Machines –II Lab
Category	PC
Course Code	19A241L
Year	II B.Tech
Semester	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- Determination of performance of transformers and induction motors; V and inverted V curves, Regulation of alternator's, Xd and Xq of a salient pole synchronous machine.

List of Experiments
Perform any ten in the following Experiments

1. Determination of performance of single phase transformer using O.C. and S.C. tests.
2. Determination of performance of single phase transformer using Sumpner's test.
3. Verify the conversion of 3-phase supply to 2-phase supply using Scott connection of transformers.
4. Determination of performance of three phase induction motor using No-load & blocked rotor tests.
5. Determination of Regulation of a three phase alternator by E.M.F and M.M.F. methods.
6. Draw the V and inverted V curves of a three phase synchronous motor.
7. Obtain the Equivalent circuit of a single phase induction motor.
8. Determination of Xd and Xq of a salient pole synchronous machine.
9. Share the common load using Parallel operation of single phase transformers.
10. Separation of core losses of a single phase transformer.
11. Determination of performance of three phase induction motor using Brake test.
12. Separation of no-load losses of three phase induction motor.
13. Determination of performance of single phase induction motor using Brake test.
14. Determination of Regulation of three phase alternator by Z.P.F. and A.S.A methods.
15. Determination of Efficiency of a three phase alternator.
16. Measurement of sequence impedance of a three phase alternator.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Demonstrate knowledge on identification of parts of transformers and AC machines.	L1
2. Analyze the performance of transformers and AC machines.	L4
3. Design the experimental circuit based on loading and rating of Transformers & AC machines.	L4
4. Demonstrate skills in • Obtaining the various characteristics of transformers and AC machines. • Determining the performance characteristics of transformers and AC Machines. • Determining and separation of losses in transformers and AC machines.	L1
5. Function effectively as an individual and as member in a team.	L2
6. Communicate effectively verbal and written forms.	L2

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A241L.1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
19A241L.2	2	3	-	-	-	-	-	-	-	-	-	3	3	-
19A241L.3	1	2	3	-		-	-	-	-	-	-	2	3	-
19A241L.4	3	2	2	-	3	-	-	-	-	-	-	1	-	3
19A241L.5	2	2	1	-	-	-	-	-	-	3	-	2	-	3
19A241L.6	1	-	-	-	-	-	3	-	3	-	-	1	-	-

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

Title of the Course	Electrical Circuits and Simulation Lab
Category	PC
Course Code	19A245L
Year	II B.Tech
Semester	II semester

Lecture Hours	Tutorial Hours	Practical	Credits
-	-	3	1.5

Course Objectives:

- To impart knowledge and practical exposure on various theorems of electrical circuits and to apply simulation to Electrical circuits.

Perform any ten experiments out of the following

1 Verification of Mesh & Nodal analysis
2 Verification of Thevenin's and Maximum Power Transfer theorems
3 Verification of Superposition theorem
4 Verification of compensation theorem
5 Verification of Reciprocity and Millman's theorems
6 Simulation of DC circuits.
7 DC Transient response
8 Determination of self and mutual inductances and co-efficient of coupling
9 Calibration of Z and Y Parameters.
10 Calibration of Transmission and hybrid parameters
11 Series and Parallel resonance.
12 Measurement of Active power for Star and Delta connected balanced loads
13 Measurement of Reactive power for Star and Delta connected balanced loads
14 Measurement of 3-phase power by two-watt meter method for unbalanced loads.
15 Locus diagram of RL & RC series circuits.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Analyze the basics of Electrical Circuits.	L4
2. Analyze 1-Φ AC Circuits.	L4
3. Analyze the Phenomenon of Resonance.	L4
4. Analyze Star and Delta Connections, Phase and Line quantities.	L4
5. Emphasize power measurement in three phase circuits.	L3
6. Solve electric circuits using network theorems.	L3
7. Analyze magnetic circuits.	L4

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
19A245L.1	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.2	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.3	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.4	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.5	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.6	3	-	3	3	-	-	-	-	3	-	-	-	3	-
19A245L.7	3	-	3	3	-	-	-	-	3	-	-	-	3	-