ELECTRICAL & ELECTRONICS ENGINEERING

Semester I (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC11T	Algebra and Calculus	3	-	-	3
2	BSC	20AC12T	Applied Physics	3	-	-	3
3	ESC	20A511T	Problem Solving through C programming	3	-	-	3
4	ESC	20A312T	Engineering Drawing	1	-	4	3
5	ESC	20A211T	BasicElectrical Engineering	3	-	-	3
6	ESC	20A511L	C programming Lab	-	-	3	1.5
7	BSC	20AC12L	Applied Physics Lab	-	-	3	1.5
8	ESC	20A313	Engineering and IT Workshop	-	-	3	1.5
						Total credits	19.5

Category	Credits
BSC	7.5
ESC	12
Total Credits	19.5

Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC21T	Differential equations and vector calculus	3	-	-	3
2	BSC	20AC23T	Chemistry	3	-	-	3
3	HSMC	20AC25T	Communicative English	3			3
4	ESC	20A221T	Electrical Circuits	3	-	-	3
5	ESC	20A222T	Electronic Devices and Circuits	3	-	-	3
6	BSC	20AC23L	ChemistryLab	-	-	3	1.5
7	ESC	20A222L	Electronic Devices and Circuits Lab	-	-	3	1.5
8	HSMC	20AC25L	Communicative English Lab	-	-	3	1.5
9	MC	20AC26T	Environmental Sciences	3	-	-	-
			Total credits				19.5

Category	Credits
BSC	7.5
HSMC	4.5
ESC	7.5
Total Credits	19.5

Semester III (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC32T	Transform Techniques & Complex Variables	3	-	-	3
2	PCC	20A231T	Electrical Machines- I	3	-	-	3
3	PCC	20A232T	Network Analysis and Signals	3	-	-	3
4	PCC	20A233T	Analog Electronics	3	-	-	3
5	ESC	20A234T	Switching Theory & Logic Design	3	-	-	3
6	PCC	20A231L	Electrical Machines -I Lab	-	-	3	1.5
7	PCC	20A232L	Circuits Lab	-	-	3	1.5
8	ESC	20A233L	Electrical & Electronics Simulation Lab	-	-	3	1.5
9	SC		Skill Oriented Course	1	-	2	2
						Total credits	21.5

Category	Credits
BSC	3
PCC	12
ESC	4.5
SC	2
Total Credits	21.5

Semester IV (Second year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BSC	20AC42T	Numerical Methods and Random Variables	3	-	-	3
2	PCC	20A241T	Electrical Machines -II	3	-	-	3
3	PCC	20A242T	Electrical and Electronic Measurements	3	-	-	3
4	PCC	20A243T	Electromagnetic Fields	3	-	-	3
5	HSMC	20AC45T	MEFA	3	-	-	3
6	BSC	20AC44T	Life Sciences for Engineers	3	-	-	0
7	PCC	20A241L	Electrical Machines -II Lab	-	-	3	1.5
8	PCC	20A242L	Electrical Measurements Lab	-	-	3	1.5
9	PCC	20A244L	Analog Electronics Lab	-	-	3	1.5
10	SC		Skill Oriented Course	1	-	2	2
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
BSC	3
HSMC	3
PCC	13.5
SC	2
Total Credits	21.5

Semester V (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A251T	Linear Control Systems	3	-	-	3
2	PCC	20A252T	Electric Power Transmission and Switch gear	3	-	-	3
3	PCC	20A253T	Power Electronics	3	-	-	3
4	PEC	20A25AT	Distribution of Electrical power	3	-	-	3
		20A25BT	Special Electrical machines				
		20A25CT	Instrumentation				
		20A25DT	Renewable Energy Systems				
5	OE/Job Oriented Elective		Python Programming	3	-	-	3
6	PCC	20A251L	Control Systems & Simulation Lab	-	-	3	1.5
7	PCC	20A253L	Power Electronics & Simulation Lab	-	-	3	1.5
8	SC	20AC51L	Professional Communication	1	-	2	2
9	MC	20AC52T	Constitution of India	3	-	-	0
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester				0	0	0	1.5
						Total credits	21.5
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
PCC	12
PEC	3
OEC	3
Skill advanced course/ soft skill course	2
Summer Internship	1.5
Total Credits	21.5

Semester VI (Third year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PCC	20A261T	Microprocessors and Microcontrollers	3	-	-	3
2	PCC	20A262T	Power system analysis	3	-	-	3
3	PCC	20A263T	Power system operation and control	3	-	-	3
4	PEC	20A26AT	Power System Protection	3	-	-	3
		20A26BT	Power Semiconductor Drives				
		20A26CT	Solar and Wind Energy systems				
		20A26DT	Modern control Theory				
5	OEC		Open Elective-2(MOOCS)	3	-	-	3
6	PCC		Power Systems Lab	-	-	3	1.5
7	PCC	20A261L	Microprocessors and Microcontrollers Lab	-	-	3	1.5
8	PCC	20A264L	Power systems simulation Lab	-	-	3	1.5
9	MC	20AC63T	Essence of Indian Traditional Knowledge	3	-	-	0
10	SC		Skill Oriented Course	1	-	2	2
						Total credits	21.5
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

Category	Credits
PCC	13.5
PEC	3
OEC	3
Skill advanced course/ soft skill course	2
MC	0
Industrial/Research Internship (Mandatory) 2 Months	-
Total Credits	21.5

Semester VII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PEC	20A27AT	Power Quality	3	-	-	3
		20A27BT	Embedded Systems				
		20A27CT	HVDC & FACTS				
		20A27DT	Energy Auditing and Conservation Management				
2	PEC	20A27ET	Smart Grid	3	-	-	3
		20A27FT	Program Logic Control				
		20A27GT	Hybrid Electric Vehicles				
		20A27HT	Utilization Of Electrical Energy				
3	PEC	20A27IT	Restructured Power System	3	-	-	3
		20A27JT	Electrical Machine Design				
		20A27KT	Artificial Intelligence				
		20A27LT	Energy Storage Systems				
4	OEC			3	-	-	3
5	OEC			3	-	-	3
6	HSMC		Universal Human Values II	3	0	0	3
7	SC		Skill Oriented Course	1	-	2	2
Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester				0	0	0	3
						Total credits	23
Industrial/Research Internship (Mandatory) 2 Months during summer vacation							

Category	Credits
PEC	9
OEC	6
Humanities and Social Sciences	3
Skill advanced course/ soft skill course	2
Industrial/Research Internship	3
Total Credits	23

Semester VIII (Fourth year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	PROJ	20A281P	Project work, seminar and internship in industry	0	0	0	12
Internship (6 months)							
						Total credits	12

Track	PE1	PE 2	PE 3	PE 4	PE 5
PS	Distribution of Electrical power	Power System Protection	Power Quality	Smart Grid	Restructured Power System
PE&M	Special Electrical machines	Power Semiconductor Drives	HVDC & FACTS	Hybrid Electric Vehicles	Electrical Machine Design
Energy Systems	Renewable Energy Systems	Solar and Wind Energy systems	Energy Auditing and Conservation Management	Utilization Of Electrical Energy	Energy Storage Systems
Control & Ins	Modern control Theory	Instrumentation	Embedded Systems	Program Logic Control	Artificial Intelligence

Category	Credits
BSC	21
ESC	24
HSMC	10.5
PCC	51
PEC	15
OEC	12
Skill advanced course/ soft skill course	10
Industrial/Research Internship	4.5
PROJ	12
Total Credits	160

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course Basic Electrical Engineering

Course Code 20A211T

Year I B.Tech
Semester I Semester
Branch EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

- understand the fundamental laws and circuit elements
- analyze the DC circuits.
- know the various measuring instruments and electrical installations
- understand the conventional power generation methods
- understand the solar and wind power generation methods

Unit 1 Fundamental Laws and Circuit Elements 9

Voltage, current, power, energy, charge, flux, emf ,static and dynamic emf, classification of magnets: permanent magnets and electro magnets, magnetic leakage, magnetic hysteresis, B-H curve, residual magnetism, Faraday's laws of electromagnetic induction, Fleming's right hand rule, Fleming's left hand rule, Lenz's law, Cork screw rule, Right hand thumb rule, Right hand palm rule.

Electrical circuit elements (R, L and C), Ohm's law, v-i relationships, classification of elements, voltage and current sources.

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

- understand the fundamental laws of Electrical Engineering.
- know the electrical circuit elements and their v-i relationships.
- know the electrical sources.

Unit 2 Analysis of DC Circuits 9

Network reduction techniques - series, parallel, star-delta transformation, Kirchhoff's current and voltage law, voltage division, current division, source transformation, analysis of simple circuits with dc excitation (Independent sources only).

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

- understand the network reduction techniques
- understand the Kirchhoff's laws
- solve the electrical circuits with dc excitation

Unit 3 Measuring Instruments and Electrical Installations 9

Introduction, Electrical and Electronic Instruments, Classification of Instruments, Multimeter, Function generator, Oscilloscope - Frequency Measurement, Phase Measurement.

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

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

- know the types of measuring instruments.
- understand the construction and operation of measuring instruments.
- know the various electrical installations

Unit 4 Conventional Power Generation 9

Evolution of Power System and Present-Day Scenario. Structure of a power system, Thermal power station- layout and working principle, hydro power station, layout and working principle, Nuclear power station layout and working principle Nuclear Fission and Chain Reaction- Nuclear Fuels- Principle of Operation of Nuclear Reactor.

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

- know the evolution of power system and present-day scenario
- understand the conventional power generation methods.

Unit 5 Solar and Wind Power Generation 9

Solar power generation - principle of solar Radiation, PV Cell, v-i characteristics. wind power Generation - construction of typical wind turbine - horizontal and vertical axis wind turbines.

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

- understand the electrical power generation using solar and wind power

Prescribed Text Books/ References:

1. D.P.Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D.C.Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
3. P.S.Dhogal, "Basic Electrical Engineering with Numerical Problems" McGraw Hill
4. S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011.
5.A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.
6. C.L Wadhwa, " Electric Power Generation,Distribution and Utilization", New Age Inter. (P) Ltd., 2005.
7. G.D. Rai, " Non Conventional Energy Sources" , Khanna Publishers, 2000.

Course Outcomes:

At the end of the course, the student will be able to	Blooms Level of Learning
1. understand the fundamental laws and circuit elements	L2
2. analyze the DC circuits.	L4
3. know the various measuring instruments and electrical installations	L2
4. understand the conventional power generation methods	L2
5. understand the solar and wind power generation methods	L2

CO-PO Mapping:

SCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A211T.1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	1
20A211T.2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	1
20A211T.3	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
20A211T.4	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
20A211T.5	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

Department of Electrical and Electronics Engineering

Title of the Course	Electrical Circuits
Course Code	20A221T

Year	I B.Tech
Semester	II Semester
Branch	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
• To learn a number of powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis and graphical solution to electrical network
• To learn the concepts of reactance and impedance to analyse simple a.c. circuits and methods to calculate power and power factor
• To Comprehend three phase systems with balanced and unbalanced loads and power measurements
• To Solve different complex circuits Network theorems.
• To understand frequency response in electrical circuits and clear understanding of the important parameters of a magnetic circuit.

Unit 1	Network Analysis:	(9)
Mesh, Super Mesh, Nodal and Super Node analysis-Basic Definitions of Network Topology– Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks –Problems, Network equilibrium equations using topology. Duality & Dual Networks-Problems.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• Develop the basic concepts of network analysis, which is the pre-requisite for all the electrical engineering subjects		
• Use network techniques like node analysis and loop analysis to write equations for large linear circuits		
• Analyze circuits using graph theory.		

Unit 2	Fundamentals of 1-φ ac circuits:	(9)
Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions: Cycle. Time period, frequency, Peak value, peak –peak value. 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. Analysis of Single Phase ac Circuits-Problems		
Learning Outcomes: At the end of the unit, the student will be able to		
• Understand and use the concepts of reactance and impedance to analyse simple a.c. circuits		
• Calculate the power dissipation of an a.c. circuit, and understand the concept of power factor.		

Unit 3	Three phase circuits:	(9)
Advantages of Three phase AC supply-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.
Learning Outcomes: At the end of the unit, the student will be able to
• Understand 3-phase ac circuits for designing and analysis of power system networks.

Unit 4	Network Theorems	(9)
Superposition, Thevenin's, Norton's, Maximum Power Transfer,Millman's, Reciprocity, Substitution, Compensation and Tellegen's Theorems for DC and AC excitations		
Learning Outcomes: At the end of the unit, the student will be able to:		
• Understand network theorems to simplify the complex networks.		

Unit 5	Resonance &magnetically coupled circuits:	(9)
Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems. Magnetically Coupled Circuits: Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling-Analysis of Coupled Circuits		
Learning Outcomes: At the end of the unit, the student will be able to:		
• Explain the effect of resonance, and its implications for practical circuits		
• Design resonant circuits which are used in wireless transmission and communication networks		

Prescribed Text Books:

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

Reference Books:

1. M.E. Van Valkenberg. Network Analysis. 3rd edition, Pearson Publications, New Delhi 2006.
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:	Blooms Level of Learning
At the end of the course, the student will be able to	
Apply the concepts of mesh and nodal analysis and analyze electrical circuits using graph theory.	L3
Acquire knowledge about single phase ac circuits	L2
Acquire knowledge about three phase ac circuits	L2
Analyze the circuit using Network simplification theorems.	L4
Analyze series, parallel resonant circuits and magnetic circuits.	L4

CO-PO Mapping:

SCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
20A221T.1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
20A221T.2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
20A221T.3	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
20A221T.4	3	2	2	1	1	-	-	-	-	-	-	-	3	-	-
20A221T.5	3	2	2	1	-	-	-	-	-	-	-	-	3	-	-

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)
Department of Electrical and Electronics Engineering

Title of the Course	**Fundamentals of Electronic Devices and Circuits**
Course Code	20A222T

Year	I
Semester	II
Branch	EEE

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
• To understand the concepts of Diodes and their applications
• To understand the operation of BJT and its biasing concepts.
• To understand the small signal analysis of BJT.
• To understand the operation of FET and its biasing concepts .
• To understand the working principles of special purpose electronic diodes.

Unit 1	**Diodes and Applications**	
PN-junction diode, characteristics, applications - half wave, full wave and bridge rectifier, clippers, clampers, Zener diode, characteristics, applications - voltage regulator.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• Understand operating characteristics of PN junction diode and Zener diode		
• Know the applications of PN junction diode and Zener diode		

Unit 2	**Transistor and Biasing**	
BJT construction and operation, configurations – DC load line analysis – operating point- Bias Stability - Need for Stabilization – Stabilization Factors (s,s^1,s^{11}) – Types of Biasing-Fixed Bias, Collector to Base bias, Emitter-Stabilized bias, Voltage Divider Bias.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• understand the concepts of stability and biasing of BJT		
• find the stability factor of different biasing techniques of BJT		

Unit 3	**Single Stage Amplifiers**	
Single Stage Transistor Amplifier- Transistor Amplifying Action – Practical circuit of Transistor Amplifier-Classification of Amplifiers- Amplifier equivalent circuit – Concept of h-parameters – Analysis of CE, CB and CC Amplifiers – Comparisons of CE,CB and CC.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• understand single stage transistor amplifier and it's operation.		
• understand the concepts of h-parameters		

Unit 4	**Field Effect Transistors & Its Biasing**	
Construction of JFETs – Characteristics – FET Biasing: Fixed Bias Configuration–Self Bias Configuration–Voltage Divider Biasing–Construction and Characteristics of MOSFETs–Depletion type MOSFETs–Enhancement type MOSFET		
Learning Outcomes: At the end of the unit, the student will be able to:		

• understand the characteristics of JFET and MOSFET
• understand the biasing circuits of JFET and MOSFET

Unit 5	**Special Purpose Electronic Devices**	
LED, Tunnel Diode, PIN Diode, SCR, UJT, Photo diode, Photo transistor, Varactor diode		
Learning Outcomes: At the end of the unit, the student will be able to		
• understand the construction and operation of different special purpose devices		
• identify different symbols of special purpose electronic devices.		

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 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 Publications2004
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:	
At the end of the course, the student will be able to	Blooms Level of Learning
1. Understand the operation of Diode and its applications.	L2
2. Understand the BJT operation and its biasing concepts.	L2
3. Analyze the Small signal model of BJT.	L5
4. Understand the operation of FET and its biasing.	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
CO1	-	3	2	-	-	-	-	1	-	-	1	-	3	-	-
CO2	-	3	3	-	1	-	-	2	-	-	1	-	3	-	-
CO3	-	3	2	-	1	-	-	1	-	-	2	-	2	3	-
CO4	-	3	2	-	1	-	-	1	-	-	2	-	2	-	-
CO5	-	3	2	-	1	-	-	1	-	-	1	-	-	-	3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Fundamentals of Electronic Devices and Circuits Lab
Lab Category	ESC
Course Code	20A222L
Year	I Year
Semester	II Semester (EEE)

Lecture Hours	Tutorial Hours	Practical	Credits
0	0	3	1.5

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To analyze the performance of rectifier circuits in practical approach
3. To observe the characteristics of semiconductor devices.
4. To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

List of the 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,ActiveDevices,LowpowerJFETs,MOSFETs,Photodiode,Phototransistor, LEDs, SCR and UJT.
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 and Zener Diode.
5. Half Wave Rectifier with and without filter.
6. Full Wave (Center trapped) Rectifier with and without filter.
7. Input and Output Characteristics of Transistor in CE Configuration.
8. JFET Characteristics.
9. MOSFET Characteristics
10. Frequency response of CE Amplifier.
11. SCR Characteristics.
12. LED Characteristics.

Course Outcomes:

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

CO/PO	Po1	Po2	Po3	Po4	Po5	Po6	Po7	Po8	Po9	Po10	Po11	Po12	Pso1	Pso2
Co1	2	2	2	2	2	-	2	-	2	-	-	2	2	2
Co2	2	2	2	2	2	-	2	-	2	-	-	2	2	2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

(An Autonomous Institution)

To Other Departments(CSE,AIDS,CE,ME)

Title of the Course	Basic Electrical and Electronics Engineering
Course Code	
Year	
Semester	

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

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

Unit 1	Fundamental Laws and Electrical Circuits	9
Basic definitions - Voltage, current, power, energy, charge, flux, static and dynamic emf, Faraday's laws of electromagnetic induction, Fleming's right hand rule, Fleming's left hand rule, Lenz's law, Cork screw rule, Right hand thumb rule, Right hand palm rule, types of elements, ohms law, resistive, inductive, capacitive networks, Series-parallel circuits and Kirchhoff's laws.		
Learning Outcomes: At the end of the unit, the student will be able to		
• understand the fundamental laws of Electrical Engineering.		
• understand the Kirchhoff's laws		

Unit 2	DC Machines	9
DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications. DC Motor: principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Swinburne's test and Speed control methods.		
Learning Outcomes: At the end of the unit, the student will be able to		
• understand construction and operation of DC machines		
• analyze the performance of DC machines		
• know the speed control methods of DC motor		

Unit 3	AC Machines	9
1-Φ Transformer: Principle of operation, emf equation, losses, efficiency and regulation calculations using OC and SC tests. 3-Φ Alternator: Principle of operation of alternators-Regulation by synchronous impedance method. 3-Φ Induction Motor: Principle of operation of induction motor, Brake Test on 3-Φinduction motor.		
Learning Outcomes: At the end of the unit, the student will be able to		
• understand construction and operation of various AC machines		
• analyze the performance of various AC machines		

Unit 4	Diode and Transistor	9
Diode: PN junction diode, symbol, v-icharacteristics, applications, half wave, full wave and bridge rectifiers. Transistor: PNP and NPN transistor, characteristics of CE configuration.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• understand operating characteristics of PN junction diode		
• know the applications of PN junction diode		
• understand the operation of various types of BJTs		
• understand operating characteristics of CE configuration of BJTs		

Unit 5	Measuring Instrumentsand Electrical Installations	9
Introduction, Electrical and Electronic Instruments, Classification of Instruments, Multimeter, Function generator, CRO: Block diagram of CRO, Principle of CRT (Cathode Ray Tube), applications of CRO, voltage, current and frequency measurements using CRO. Switch Fuse Unit (SFU), MCB, types of wires and cables, earthing, elementary calculations for energy consumption.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• know the types of measuring instruments.		
• understand the construction and operation of measuring instruments.		
• know the various electrical installations		

Prescribed Text Books:
1. V.K. Mehta, Principles of Electrical and Electronics Engineering. S. Chand & Co 2010.
2.T.Thyagarajan, Fundamentals of Electrical and Electronics Engineering. SciTech publications, 2011, 5th Ed
3. D. C. Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
4.P.S.Dhogal "Basic Electrical Engineering with Numerical Problems" McGraw Hill, 2006.
5.A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.
Reference Books:
1. M.S Naidu and S.Kamakshaiah, Introduction to Electrical Engineering. TMH Publications.
2. D.P Kothari and I.J Nagrath, Basic Electrical Engineering, TMH, 3rdEd.2010
3. Millman and Halkias, Electriconics devices and circuits
4.S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011.

Course Outcomes:	
Student will be able to	Blooms Level of Learning
• impart the basic knowledge about the Electric circuits.	L1
• understand the working of various DC Machines and analyze their performance.	L1,L4
• understand the working of various AC Machines and analyze their performance.	L1,L4
• know about various electronic devices.	L1
• understand the various electrical installations and measuring instruments	L1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	Basic Electrical and Electronics Engineering Lab
Category	ES
Course Code	20A223L
Year	I B. Tech Semester II semester
Semester	II

Lecture Hours	Tutorial Hours	Practical	Credits
0 3	0	3	1.5

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

List of Experiments: Perform any ten experiments out of the following.
Experiment 1 Pre-determination of efficiency of DC shunt Machine working as Motor as well as Generator (Swinburne's Test)
Experiment 2 Determination of Performance Characteristics of DC Shunt Motor (Brake Test)
Experiment 3 Speed Control of DC Shunt Motor (Armature Control Method and Field Control Method) Experiment 4 Determination of Performance Characteristics of Three Phase Squirrel Cage Induction Motor (Brake Test)
Experiment 5 Predetermination of efficiency and regulation of Single Phase Transformer at different power factors (OC and SC test on single phase transformers)
Experiment 6 Study of V-I Characteristics of PN junction Diode.
Experiment 7 Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without Capacitive filter.
Experiment 8 Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without Capacitive filter.
Experiment 9 Study of Input and Output Characteristics of Bipolar Junction Transistor in Common Emitter Configuration.
Experiment 10 Study of Cathode Ray Oscilloscope. (CRO)
Experiment 11 Determination of V-I Characteristics of ZENER Diode.
Experiment 12 Study of Frequency response of a single stage CE amplifier

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

COs-POs-PSOs Mapping Table

Course Outcomes	Program Outcomes												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3			3										
2	3			3										
3								3						
4											1			
5											1			

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET

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To ECE Department

Title of the Course	Electrical Circuits and Technology
Course Code	
Year	II
Semester	i

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives:
• To impart the knowledge about the basic concepts of circuit analysis and Transient Response.
• To inculcate the understanding about AC circuits and resonance
• To understand the concepts of two port networks.
• To understand the working of various Electrical Machines

Unit 1	Basic Electrical Circuits &DC Transient Analysis	9
BASIC ELECTRICAL CIRCUITS: Network Reduction Techniques, Star &Delta transformations, Source Transformation, Nodal & Mesh Analysis, Super Node & Super Mesh Concepts - Problems. TRANSIENT ANALYSIS: Transient Response of RL, RC & RLC Series Circuits for DC Excitation using differential equation approach.		
Learning Outcomes: At the end of the unit, the student will be able to		
• understand the fundamental laws of Electrical Engineering.		
• understand the Kirchhoff's laws • Use network techniques like node analysis and loop analysis to write equations for large linear circuits		

Unit 2	Fundamentals of AC Circuits& Resonance	9
FUNDAMENTALS OF AC CIRCUITS: Advantages of AC Supply, Types of Wave Forms, Importance of Sinusoidal Wave Forms, Cycle, Time Period, Frequency & Amplitude, Determination of Average & RMS Value, Form Factor & Peak Factor for different Alternating Wave Form. RESONANCE: Resonant frequency, Band Width & Q-Factor for Series and Parallel RLC Network only.		
Learning Outcomes: At the end of the unit, the student will be able to		
• Understand and use the concepts of reactance and impedance to analyse simple a.c. circuits		
• Calculate the power dissipation of an a.c. circuit, and understand the concept of power factor.		
• Explain the effect of resonance, and its implications for practical circuits		
• Design resonant circuits which are used in wireless transmission and communication networks		

Unit 3	Two Port Networks	9
TWO PORT NETWORKS: Impedance, Admittance, Hybrid, Transmission (ABCD) Parameters, Conversion of one Parameter to another Parameter, Conditions for Reciprocity & Symmetry, Inter connection of Two Port Networks in Series, Parallel and Cascaded Configurations, Problems.		

Unit 4	D.C Machines	9
DC Generator: Constructional Features, Principle of operation, EMF Equation, Types, Magnetization Characteristics, Applications. DC Motor: Principle of operation, Back EMF, Torque Equation, Characteristics of DC Shunt Motor, Losses & Efficiency, Testing - Brake Test & Swinburne's Test - Speed control of DC shunt Motor, Applications..		
Learning Outcomes: At the end of the unit, the student will be able to:		
• understand construction and operation of DC machines		
• analyze the performance of DC machines		
• know the speed control methods of DC motor		

Unit 5	AC Machines	9
Single Phase Transformer: Principle of operation, Types, Constructional Features, EMF equation, Losses, Efficiency & Regulation, OC & SC Tests and Pre-Determination of Efficiency & Regulation. Three Phase Induction Motor: Principle of operation, Torque equation, Torque-slip characteristics, Brake test on three phase induction motor.		
Learning Outcomes: At the end of the unit, the student will be able to:		
• understand construction and operation of various AC machines		
• analyze the performance of various AC machines		

Prescribed Text Books:
1. Network Analysis by A. Sudhakar&Shyam Mohan S.Pillai, Tata McGraw Hill, 3 rd Edition, New Delhi, 2009.
2.T.Thyagarajan, Fundamentals of Electrical and Electronics Engineering. SciTech publications, 2011, 5th Ed
3. D. C. Kulshreshta, "Basic Electrical Engineering", McGraw Hill, 2009.
4.P.S.Dhogal "Basic Electrical Engineering with Numerical Problems" McGraw Hill, 2006.
5. A. Chakrabarti. Circuit Theory. 6 th edition, DhanpatRai& Co, New Delhi, 2014.
6.A.Sudhakar and Shyammohan S Palli, "Circuits and Networks" McGraw Hill, 2018.
Reference Books:
1. M.S Naidu and S.Kamakshaiah, Introduction to Electrical Engineering. TMH Publications.
2. D.P Kothari and I.J Nagrath, Basic Electrical Engineering, TMH, 3rdEd.2010
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4.S.Salivahanan, N,Suresh Kumar, "Electronic Devices and Circuits" McGraw Hill, 2011.

Course Outcomes:	
Student will be able to	Blooms Level of Learning
• impart the basic knowledge about the Electric circuits.	L1
• understand the working of various DC Machines and analyze their performance.	L1,L4
• understand the working of various AC Machines and analyze their performance.	L1,L4
• know about various electronic devices.	L1
• understand the various electrical installations and measuring instruments	L1

COs-POs-PSOs Mapping Table

Course Outcomes	Program Outcomes												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	2	-	2	-	-	-	-	2	-	2	-	2	2
2	2	3	2	2	-	-	-	-	2	-	2	-	2	3
3	2	3	2	2	-	-	-	-	2	-	2	-	2	3
4	2	2	-	3	-	-	-	-	2	-	2	-	2	2
5	2	2	1	3	-	-	-	-	2	-	2	-	2	2