LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING(AUTONOMOUS)

L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.

B.TECH. (ELECTRICAL AND ELECTRONICS ENGINEERING)

COURSE STRUCTURE

III-SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
EE301	Electrical Circuit Analysis - II	4	1	-	25	75	100	4
EE302	Electromagnetic Fields	4	1	-	25	75	100	4
EE303	Switching Theory and Logic Design	4	-	-	25	75	100	4
EE304	Electrical Machines - I	4	1	-	25	75	100	4
EE305	Power Systems -1	4	1	-	25	75	100	4
EE306	Electronics Devices and Circuits	4	-	-	25	75	100	3
EE351	Electrical Circuits Lab	-	-	3	25	75	100	2
EE352	Electronic Devices and Circuits Lab	-	-	3	25	75	100	2
EE353	Seminar			1	50	--	50	1
TOTAL		**24**	**4**	**7**	**250**	**600**	**850**	**28**

EE301 – ELECTRICAL CIRCUIT ANALYSIS - II

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical and Electronics discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

UNIT - I

Network theorems (both ac & dc networks)
Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation and Tellegen's theorems- Statements of theorems and steps for solving networks.

UNIT - II

Transient Analysis (both ac & dc networks)
Introduction - Initial conditions of all elements-Transient response of Series R-L, R-C and R-L-C circuits – Solution using differential equation approach and Laplace transform methods of solutions.

UNIT - III

Three Phase Circuits
Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits –Measurement of active and reactive power.

UNIT - IV

Two Port Network Parameters
Open circuit impedance(Z) network parameters, Short circuit admitance(Y) network parameters –Transmission(ABCD), Inverse transmission($A^1B^1C^1D^1$) and hybrid parameters – Relationship between each two port network parameters – Reciprocity and Symmetry concepts of two port network parameters network.

UNIT - V

Network Synthesis
Hurwitz Polynomials, Positive Real Functions, Frequency Response of Reactive One-Ports, Synthesis of Reactive One Port by Foster 'S Method, Synthesis of Reactive One Port By Cauer Method, Synthesis of RL and RC One Port Networks by Foster and Cauer Methods.

TEXT BOOK

Engineering circuit analysis – by William Hayt and Jack E. Kimmerly, Mc Graw Hill Company, 6th edition.

REFERENCES

1. Linear circuit analysis (time domain phasor, and Laplace transform approaches) Second edition by RAYMOND A.DeCARLO and PEN-MIN-LIN, Oxford University Press. Second edition 2004.
2. Network Analysis by Vanvalkenburg, PHI.
3. Electrical Circuits: S.Sudhakar, P.S.M.Satyanarayana, TMH Publication.
4. Electric Circuits by A. Chakrabarthy, Dhanipat Rai & Co.
5. Network Theory: - N.C. Jagan & C.Lakshminarayana, B.S Publications.

EE302 – ELECTROMAGNETIC FIELDS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1 Period/Week**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT - I

Electrostatics
Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Gauss's law – Application of Gauss's Law – Maxwell's first law, div(D) =ρv

UNIT - II

Conductors and Dipole
Laplace's and Poison's equations – Solution of Laplace's equation in one variable. Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

UNIT - III

Magneto Statics
Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.
Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

UNIT - IV

Force in Magnetic fields
Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field. Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

UNIT - V

Time Varying Fields

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms –Maxwell's fourth equation, Curl (E)=-□B/□t– Statically and Dynamically induced EMFs – Simple problems - Modification of Maxwell's equations for time varying fields – Displacement current – Pointing Theorem and Pointing vector.

TEXT BOOKS

"Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon.2006.

REFERENCES

1. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2nd editon
2. "Electromagnetics" by J P Tewari.
3. "Electromagnetics" by J. D Kraus Mc Graw-Hill Inc. 4th edition 1992.
4. "Electro magnetic Fields" by Sadiku, Oxford Publications

EE303 – SWITCHING THEORY AND LOGIC DESIGN

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

UNIT - I

NUMBER SYSTEMS & BOOLEAN ALGEBRA : Philosophy of number systems – complement representation of negative numbers-binary arithmetic-binary codes-error detecting & error correcting codes – hamming codes.
Fundamental postulates of Boolean Algebra - Basic theorems and properties - switching functions–Canonical and Standard forms-Algebraic simplification of digital logic gates, properties of universal gates-Multilevel NAND/NOR realizations.

UNIT - II

MINIMIZATION OF SWITCHING FUNCTIONS:
Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabulation Method, Prime –Implicant chart, simplification rules.

UNIT - III

COMBINATIONAL LOGIC DESIGN: Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips MSI & LSI: MUX Realization of switching functions, Parity bit generator, Code-converters.
PROGRAMMABLE LOGIC DEVICES Basic PLD's-ROM, PROM, PLA, PLD. Realization of Switching functions using PLD's.

UNIT - IV

SEQUENTIAL CIRCUITS: Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring & Shift counters, Serial binary adder, sequence detector.
Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

UNIT - V

ALGOROTHIMIC STATE MACHINES: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples.

TEXT BOOKS

Digital Design – Morris Mano, PHI, 3rd Edition, 2006.

REFERENCES

1. Digital Design, J F Wakerly, Prentice Hall 2000
2. Digital Electronics, 3rd Edition, RP Jain, Modern TMH, 2000
3. Switching & Finite Automata theory – Zvi Kohavi, TMH,2nd Edition.
4. An Engineering Approach To Digital Design – Fletcher, PHI.
5. Digital Integrated Electronics, Taub and Schilling, Mc-Graw Hill, 1977.
6. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
7. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

EE304 – ELECTRICAL MACHINES - I

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

This course introduces the concepts of various AC & DC machines in Electrical Engineering discipline. The emphasis of this course is laid on the machines which include D.C. Generators, D.C Motors, Single phase transformers, Auto transformers & Poly phase transformers.

UNIT - I

D.C. Generators

Construction & Principle of Operation of D.C. Generators – E.M.F Equation- Types of D.C Generators –Armature reaction –Methods of decreasing the effects of armature reaction– Compensating winding-Commutation– Methods of improving commutation.– O.C.C-Voltage build up in generators-Critical field resistance and critical speed - Causes for failure to self excite and Remedial measures–Load characteristics of shunt, series and compound generators.

UNIT - II

D.C Motors

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation–Speed control-3 point and 4 point starters–Constant and Variable losses-calculation of efficiency – condition for maximum efficiency – brake test – Swinburne's test –Hopkinson's test.

UNIT - III

Single phase transformers

Types - constructional details-emf equation - operation on no load and on load - phasor diagrams– Equivalent circuit - losses and efficiency-regulation. All day efficiency-effect of frequency & supply voltage on core losses- minimization of hystersis and eddy current losses.

UNIT - IV

Testing of Single Phase Transformer

O.C and S.C tests - Sumner's test - predetermination of efficiency and regulation-separation of losses test-Parallel operation with equal and unequal voltage ratios.

UNIT - V

Auto transformers & Poly-phase transformers

Auto transformers- comparison with two winding transformers-Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ-Scott connection -three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing.

TEXT BOOKS

Electric Machines –by I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition.2005

REFERENCES

1. Electric Machinery – A. E. Fitzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th editon
2. Electrical Machines – P.S. Bimbra. Khanna Publishers
3. Electric Machines –by Ashfaq Husain, Danapati Rai&Co, New Delahi, 2002 edition.

EE305 – POWER SYSTEMS - I

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**: 1**	**External Marks**	**: 75**
Credits	**: 4**	**External Examination**	**: 3 Hrs**

OBJECTIVE

Electrical power plays significant role in day to day life of entire mankind. This course concerns with various types of power generation (renewable and non-renewable) along with its economic aspects.

UNIT - I

THERMAL POWER STATIONS
Line diagram of thermal power station showing paths of coal, steam, water, air, ash and flue gasses- Brief description of TPS components: Boilers, super heaters, Economizers, turbines, condensers, cooling towers and chimney.

UNIT - II

NUCLEAR POWER STATIONS
Working principle, nuclear fuels, nuclear reactor components: Moderators, control rods, Reflectors and coolants. Types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation hazards and shielding.

UNIT - III

GAS, WIND AND SOLAR POWER GENERATION
Gas power station: Principle of operation and components (block diagram approach only).Solar power generation: Line diagram of solar energy storage, solar energy collector, point focusing collector, solar power generation.

UNIT - IV

ECONOMIC ASPECTS OF POWER GENERATION
Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, capacity factor, capacity, utilization and plant use factors – Numerical problems.

UNIT - V

TARIFF METHODS
Costs of generation and their division into fixed, semi-fixed and running costs. Desirable characteristics of a Tariff Methods, Tariff Methods: simple rate, flat rate, block rate, two-part, three-part, and power factor tariff methods.

TEXT BOOK

"Power Generation Technologies" – Paul Breeze, Elsevier Ltd, 2005 edition

REFERENCES

1. "Generation, Distribution and Utilization of Electrical Energy" by C.L.Wadhwa, New Age International (P) Ltd, 1999 edn.
2. "Principles of Power Systems" by V.K.Mehta & Rohit Mehta, S.Chand & Co. Ltd.
3. "Non-Conventional Energy Sources" by G.D.Rai, Khanna Publications.
4. "A Text Book on Power system Engineering" by A.Chakrabarti, M.L.Soni, P.V.Gupta & U.S.Bhatnagar, Dhanpat Rai & Co.

EE306 – ELECTRONICS DEVICES AND CIRCUITS

Lecture	**: 4 Periods/week**	**Internal Marks**	**: 25**
Tutorial	**:**	**External Marks**	**: 75**
Credits	**: 3**	**External Examination**	**: 3 Hrs**

OBJECTIVE

The aim of this course is to familiarize the student with the analysis and design of diode circuits, basic transistor amplifier circuits, tuned amplifiers and oscillators.

UNIT - I

ELECTRON DYNAMICS JUNCTION DIODE CHARACTERISTICS

Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only Electrostatic and magnetic focusing. Review of semi conductor Physics, Open-circuited p-n junction, , PN diode as a rectifier (forward bias and reverse bias), The current components in p-n diode, Law of junction, Diode equation(Qualitative treatment only), Volt-ampere characteristics of p-n diode, Temperature dependence of VI characteristic, Transition and Diffusion capacitances,

UNIT - II

VARIOUS TYPES DIODES AND ITS APPLICATIONS RECTIFIERS, FILTERS AND REGULATORS

Breakdown Mechanisms in Semi Conductor (Avalanche and Zener breakdown) Diodes, Zener diode characteristics, Characteristics of Tunnel Diode, Varactar Diode, LED, LCD. And photo diode.Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, PI- section filter, Simple circuit of a regulator using zener diode, Series and Shunt voltage regulators.

UNIT - III

TRANSISTOR AND FET CHARACTERISTICS, BIASING AND STABILISATION

Construction, principle of operation/ Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, JFET characteristics (Qualitative treatment only) and MOSFETS, Enhancement and depletion mode.

MOSFET, Introduction to SCR and UJT. BJT biasing, DC equivalent model, criteria for fixing operating point, Methods of bias stabilization, Stabilization Techniques(Fixed bias, Collector to base bias, Self bias)Stabilization factors, (S, S', S''),Thermistor and Sensitor Compensation techniques, (Compensation againstvariation in VBE, Ico,) Thermal run away,Condition to avoid Thermal Run away.

UNIT - IV

AMPLIFIERS

Small signal low frequency transistor amplifier circuits:Hybrid model of a transistor,

voltage gain, current gain, Input impedance and Output impedance,FET and MOSFET Small Signal model,Voltage gain of common drain FET amplifier, Voltage gain of common source **FET amplifier**

Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on input and output characteristics in various feedback topologies, Simple Examples of various topologies with discrete components.

UNIT - V

FEEDBACK AMPLIFIERS and OSCILLATORS

Condition for oscillations. Barkhausen criterian,RC-phase shift oscillators with Transistor and FET devices, Wein bridge oscillator, Crystal oscillators.

TEXT BOOKS

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition,2006.

REFERENCES

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
3. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.
4. Electronic Devices and Circuits-Dr K.Satyaprasad, VGS Publications,2006
5 Electronic Devices and Circuits –Prof B..Visvesvara Rao et.al Peason Education 2nd Edition

EE351 – ELECTRICAL CIRCUITS LAB.

Lab.	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

PART-A: ELECTRICAL CIRCUITS

1) RMS Value of complex waveform
2) Verification of superposition Theorem and maximum power transfer theorem
3) Verification of Thevenin's and Norton's Theorem
4) Verification of Compensation & Reciprocity Theorem
5) Series and parallel resonance
6) Measurement of parameters of a choke coil using 3 Voltmeter and 3 Ammeter method.
7) Determination of Self, Mutual Inductances and Coefficient of coupling
8) Z and Y Parameters, Transmission and hybrid parameters
9) Measurement of Active & Reactive power and pf for Star and Delta connected balanced loads
10) Measurement of power by two wattmeter method for 3- phase unbalanced loads

PART-B: PSPICE SIMULATION

11) Transient response of RL and RC circuits for DC Input
12) Loop and Nodal Analysis

EE352 – ELECTRONIC DEVICES AND CIRCUITS LAB.

Lecture	**: 3 Periods/week**	**Internal Marks**	**: 25**
		External Marks	**: 75**
Credits	**: 2**	**External Examination**	**: 3 Hrs**

List of Experiments

1. Signal Generation
2. PN junction diode characteristics
3. Zener diode characteristics
4. Full wave rectifier without & with filters
5. Transistor CE characteristics
6. Transistor CB characteristics
7. FET characteristics
8. CE Amplifier
9. CC Amplifier
10. FET Amplifier

Additional Experiments

11. Feedback amplifier (Voltage Series)
12. Feedback amplifier (Current Series)