Sardar Vallabhbhai National Institute of Technology, Surat-395007
(A DEEMED UNITVERSITY)

DEPARTMENT OF ELECTRICAL ENGINEERING

B.TECH.-II-ELECTRICAL TEACHING SCHEME (Revised)

SEMESTER - III

Sr. No.	Course Code	Course	L	T	P	Credits	Examination Scheme				
			Hrs	Hrs	Hrs		Theory Marks	Tutorial Marks	Termwork Marks	Practical Marks	Total Marks
1	MH210	Engineering Mathematics-III	3	1	0	04	100	25	-	-	125
2	EC209	Linear Electronics	3	0	2	04	100	-	20	30	150
3	EE201	Electrical Circuits	4	1	0	05	100	50	-	-	150
4	EE203	Electrical Machines-I	3	1	2	05	100	25	20	30	175
5	CE209	Solids and Fluids Mechanics	4	0	0	04	100	-	-	-	100
		TOTAL	**17**	**3**	**4**	**22**	**500**	**100**	**40**	**60**	**700**
	TOTAL CONTACT HOURS		**24**								
	TOTAL CREDITS		**22**								

SEMESTER - IV

Sr. No.	Course Code	Course	L	T	P	Credits	Examination Scheme				
			Hrs	Hrs	Hrs		Theory Marks	Tutorial Marks	Termwork Marks	Practical Marks	Total Marks
1	ME212	Applied Thermodynamics & Thermal Engineering	3	0	0	03	100	-	-	-	100
2	EC212	Digital Circuits	3	0	2	04	100	-	20	30	150
3	EE202	Network and Systems	4	1	0	05	100	50	-	-	150
4	EE204	Electrical Machines-II	3	1	2	05	100	25	20	30	175
5	EE206	Computer Applications for Electrical Engineering	3	1	2	05	100	25	20	30	175
		TOTAL	**16**	**3**	**6**	**22**	**500**	**100**	**60**	**90**	**750**
	TOTAL CONTACT HOURS		**25**								
	TOTAL CREDITS		**22**								

B.Tech. (Electrical), Semester – III	L	T	P	C
MH210 : ENGINEERING MATHEMATICS III	3	1	0	4

- **CALCULUS, MULTIPLE INTEGRALS** **(08 Hours)**

  Reorientation of concepts of integrals, Double and Triple integrals, evaluation techniques, change of order of Integration, change of variable, Application of double and triple integrals for evaluation of area, volume and mass.

- **BASIC CONCEPTS OF VECTOR CALCULUS** **(08 Hours)**

  Line Integrals, scalar and vector point function, differential operator, gradient, directional derivative, physical meaning of gradient, divergence, curl and Laplacian with their properties, Surface Integral, Volume integral, Green's ,Gauss and Stoke's theorem & application.

- **FOURIER SERIES** **(06 Hours)**

  Definition, Fourier series with arbitrary period, in particular periodic function with period 2π. Fourier series of even and odd function, Half range Fourier series.

- **FOURIER INTEGRAL & TRANSFORM** **(06 Hours)**

  Fourier Integral theorem, Fourier sine and cosine integral complex form of integral, Inversion formula for Fourier transforms, Fourier transforms of the derivative of a function.

- **PARTIAL DIFFERENTIAL EQUATION** **(06 Hours)**

  Second order pde of mathematical physics (Heat, wave and Laplace equation, one dimensional with standard boundary conditions, solution by separation of variable method using Fourier series, Solution by Separation of variables & transformation techniques.

- **COMPLEX VARIABLES** **(08 Hours)**

  Basic mathematical concept, Analytic function, C – R equations, Harmonic functions, its applications, Linear transformation of complex domain, some special transformation, bilinear transformations, conformal mapping and its application, complex integration including contour integration.

Total Hours: 44

BOOKS RECOMMENDED:

1. Kreyszing E., 'Advanced Engineering Mathematics', John Wiley, Int. Student Ed. 1995.
2. Wiley C. R., 'Advanced Engineering Mathematics', McGraw Hill, Int. Student Ed. 1993.
3. O'Neel Peter., 'Advanced Engg. Mathematics', Thompson, Singapore, Ind. Ed. 2002.
4. Greenbar Michael D., 'Advanced Engg. Mathematics', Pearson, Singapore, Ind. Ed. 2007.
5. Ramana D. V., 'Higher Engg. Mathematics', The MaGraw-Hill Inc., New Delhi, 2007.

B.Tech. (Electrical), Semester – III	L	T	P	C
EC209 : LINEAR ELECTRONICS	3	0	2	4

- **BIPOLAR JUNCTION TRANSISTOR ANALYSIS & DESIGN** **(08 Hours)**

  Transistor Characteristic; Plots For NPN And PNP Configurations; Current Flow Mechanism In The Junction Transistor And Calculation Of Alpha And Beta; Analysis Of CE Configuration; Current Amplification In The Transistor; Graphical Analysis Of Transistor Circuits; Power Calculations; Infinite Bypass Capacitor; Infinite Coupling Capacitors; Different Dc Biasing Methods; Fixed Bias, Emitter Stabilized Bias, Potential Divider Bias, Dc Bias With Voltage Feedback; Common Base Configuration Analysis; Emitter Follower.

- **AUDIO FREQUENCY LINEAR POWER AMPLIFIERS** **(08 Hours)**

  Introduction To Class A, B, AB And C Operation; Class A Common-Emitter Power Amplifier; Transformer Coupled Amplifier; Class B Push-Pull Power Amplifier; Amplifiers Using Complementary Symmetry; Class C Amplifier.

- **NEGATIVE FEEDBACK AMPLIFIERS** **(08 Hours)**

  Feedback – Principal Of Negative Voltage Feedback In Amplifiers- Gain Of Negative Feedback Amplifier- Advantages Of Negative Voltage Feedback – Principal Of Negative, Current Feedback- Current Gain With Negative Feedback- Effects Of Negative Feedback- Emitter Follower- D.C. Analysis Of Emitter Follower- Voltage Gain Of Emitter Follower- Input Impedance Of Emitter Follower- Output Impedance Of Emitter Follower- Application Of Emitter Follower- Darlington Amplifier.

- **FIELD EFFECT TRANSISTORS** **(07 Hours)**

  Introduction To Theory And Operations Of N-Channel JFFT & MOSFET; Reversibility Of Drain & Source; P-Channel FET; FET Switch; MOSFET Inverter; Bias Stability In FET; Different FET Configuration.

- **OSCILLATORS** **(07 Hours)**

  Barkhausen's Criteria For Oscillators; Tank Circuit Operation, Basic Transistor AF And RF Oscillators, Phase Shift, Wien Bridge, Colpitts, Hartley, Crystal And Tune Circuit Type Oscillators (AF & RF Range).

- **DIODE CLIPPER & CLAMPER CIRCUITS** **(07 Hours)**

  Series And Shunt Diode Clippers, Clipping At Two Independent Level, Clamping Operation, Clamping Circuit, Clamping Circuit Theorem, Practical Clamping Circuits, Effect Of Diode Characteristics, Applications.

Total Hours: 45

PRACTICAL:

1. Study of BJT Characteristics.
2. Study of C_E Amplifier.
3. Study of RC Coupled / Tuned Amplifier.
4. Study of Voltage Series Amplifier.
5. Study of Current Series Amplifier.
6. Study of FET Characteristics,
7. Study of Hartly Oscillator.
8. Study of Colpit Oscillator / Wein Bridge Oscillator.
9. Study of Diode Clipper Circuits.
10. Study of Diode Clamper Circuits.

BOOKS RECOMMENDED:

1. Millman & Halkias, “Integrated Electronics”, McGraw Hill Publication, 1992
2. Boylestad & Nashlesky, “Electronic Devices & Circuit Theory”, PHI Publication, 2nd edition, 2000.
3. Schilling & Belove, “Electronic Circuits - Discrete and Integrated”, McGraw Hill Publication, 3rd edition 1989, reprint 1994
4. Albert Malvino & David J. Bates, “Electronic Principles”, Tata Mcgraw Hill, 7th Ed. 2007.

B. Tech. (Electrical), Semester – III	L	T	P	C
EE 201 : ELECTRICAL CIRCUITS	4	1	0	5

- **NETWORK CONCEPTS** **(03 Hours)**

  Network element symbols and conventions, active element conventions, current and voltage conventions, loops and meshes, nodes, coupled circuits and dot conventions.

- **GRAPH THEORY AND ITS APPLICATIONS** **(08 Hours)**

  Fundamental concepts, definitions of a graph and various related terms, paths and circuit connections, tree of a graph, cut sets and tie sets, non separable planner and dual graphs, matrices of oriented graphs, properties and inter relationships of incidence, tie set and cut set matrices, complete circuit analysis using tie set and cut set matrices.

- **NETWORK ANALYSIS TECHNIQUES AND THEOREMS** **(18 Hours)**

  Mesh currents analysis, node voltages analysis, solutions of linear nodal equations and circuit analysis using matrices, linearity and superposition, independent and dependent sources and their transformations, Thevenin's, Norton's, Millman's, Tellengen's, Reciprocity, Substitution and Maximum power transfer theorems, use of these theorems in circuit analysis, duality and concept of dual network, magnetically couples circuit analysis.

- **POLYPHASE UNBALANCED NETWORKS** **(08 Hours)**

  Analysis of polyphase circuits using Kirchoff's laws, analysis of unbalanced delta connected circuits, analysis of unbalanced three phase three wire and four wire star connected circuits., determination of neutral point potential and phase voltages for unbalanced star connected circuits, symmetrical components, its applications to the analysis of various polyphase unbalanced circuits.

- **LAPLACE TRANSFORMATION** **(08 Hours)**

  Laplace transform fundamentals, properties and theorems, unit step function, other unit functions, the impulse, ramp and doublet, Laplace transforms for shifted and singular functions, initial and final value theorems, waveform synthesis, Convolution integral.

- **AC AND DC TRANSIENTS** **(10 Hours)**

  Initial and final conditions of networks, R-L, R-C and R-L-C DC transients, two mesh transients, R-L, R-C and R-L-C sinusoidal transient analysis using Laplace transform methods, two mesh AC transients, complete response of RL, RC and RLC circuits to step, sinusoidal, exponential, ramp, impulse and the combinations of these excitations.

Total Hours: 55

BOOKS RECOMMENDED:

1. Hayt W. H., Kemmerly J. E, Durbin S. M., "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition, 2006.
2. Edminister Joseph A., "Electrical circuits", Schaum's outline series, McGraw hill, 2nd edition, 1983.
3. Van Valkenburg M.E., "Network Analysis", Prentice Hall, India, 3rd Edition, 2002.
4. Ghosh Samarjit, "Network Theory, Analysis & Synthesis", Prentice Hall, India, 2005
5. Wadhwa C.L., "Network Analysis & Synthesis", New Age International, Revised 3rd Edition, 2007.

B.Tech. (Electrical), Semester – III	L	T	P	C
EE203 : ELECTRICAL MACHINES - I	3	1	2	5

- **TRANSFORMERS** **(06 Hours)**
  Review of equivalent circuits and vector diagram, circuit parameter determination, per unit impedance, regulation, losses, efficiency, magnetic inrush and effect of saturation, parallel operation.

- **POLYPHASE TRANSFORMERS** **(11 Hours)**
  Standard connections, phase angle difference, harmonic analysis, open delta connection, Scott connections three phase to six phase conversion, three winding transforms, parallel operation.

- **AUTO TRANSFORMERS** **(02 Hours)**
  Construction, voltage and current ratios, phasor diagram and equivalent circuit.

- **TESTS ON TRANSFORMERS** **(04 Hours)**
  Polarity test, Back to back Sumpner's test.

- **INDUCTION MOTORS** **(08 Hours)**
  Review of equivalent circuit and vector diagram, performance analysis, torque-speed characteristics, no load and blocked rotor tests, circle diagram.

- **STARTING, BRAKING AND SPEED CONTROL** **(07 Hours)**
  Double cage motors, starting problems, methods of starting, speed control methods, cascade connections, cogging and crawling, regenerative braking, plugging, ac and dc dynamic (rheostatic) braking.

- **INDUCTION GENERATORS AND REGULATOR** **(03 Hours)**
  Principle of operation, performance analysis, application.

- **SINGLE PHASE INDUCTION MOTORS** **(04 Hours)**
  Principle of operation, revolving field theory, cross field theory, equivalent circuit and performance analysis, determination of circuit parameters by no- load and blocked rotor test, starting methods, unbalanced operation of three phase induction motor.

Total Hours: 45

PRACTICALS:

1. Determination of efficiency & regulation of single- phase transformer from Open circuit and short circuit test.
2. Determination of efficiency & regulation of single- phase transformer from Sumpner's test.
3. Scott connection of 1-phase transformers.
4. Open delta connection of three single-phase transformers.
5. Standard connections for three-phase transformer.
6. Load test on three-phase Induction Motor.
7. Load test on three-phase Induction Generator.
8. Determination of the equivalent circuit parameters from No-Load and Blocked rotor tests of three-phase Induction Motor.
9. Determination of the equivalent circuit parameters from No-Load and Blocked rotor tests of 1-phase Induction Motor.
10. Determination of the performance parameters of three-phase induction motor from circle diagram.
11. Induction regulator.
12. Unbalanced operation of three-phase Induction Motor.

BOOKS RECOMMENDED:

1. Say M. G., "The performance and design of alternating current machines", CBS Publishers and Distributors , Delhi, 1983.
2. Fitzgerald, Kingsley and Umans, "Electric Machinery":, TMH, New Delhi, 2003
3. Mukherjee and chakravorty, "Electrical Machines", Dhanpat Rai Pub., New Delhi, 2005.
4. Nagrath and Kothari, "Electric Machines", TMH, New Delhi, 2005.
5. Bimbhra P. S., "Electrical Machinery", Khanna Pub., Delhi, 1998
6. Taylor E. O., "Performance and Design of A.C. Commutator motor", A. H. Wheeler, Allahabad, 1990.

B.Tech. (Electrical), Semester – III	L	T	P	C
CE209 : SOLID & FLUID MECHANICS	4	0	0	4

SOLID MECHANICS

- **STRESSES AND STRAINS** **(06 Hours)**

  Concept of stresses and strains – Types of stresses – Hook's Law – Lateral strain – Poisson's ratio – Elongation due to own weight – Tapering sections – Varying cross sections – Composite sections – Relation between Modulus of Elasticity, Modulus of Rigidity and Bulk Modulus – Thermal Stresses.

- **SHEAR FORCE DIAGRAM AND BENDING MOMENT DIAGRAM** **(06 Hours)**

  Types of beams – Types of supports – Types of loads – Shear force – Bending moment – Sign convention – Overhanging beams – Point of contra-flexure – varying loads – Relation between SF and BM.

- **STRESSES IN BEAMS** **(06 Hours)**

  Theory of simple bending – Moment of Resistance – Beam of Uniform strength – Fletched beams – Shear stress concept – Derivation of shear stress – Shear stress Variation in rectangular, circular, T-section and I – section.

- **TORSION** **(05 Hours)**

  Basic theory of Torsion – Solid shaft – Hollow shaft – Power transmitted by shaft – Composite shafts.

- **MECHANICAL PROPERTIES OF MATERIAL** **(05 Hours)**

  Tensile Stress – Strain diagram for mild steel – Ductility of metal – Brittleness – Toughness – Hardness – Fatigue.

FLUID MECHANICS

- **FLUID PROPERTIES** **(03 Hours)**

  Scope of fluid mechanics, definition of fluid, fluid continuum concept, fluid properties and classification of fluids.

- **FLUID STATICS** **(05 Hours)**

  Fluid pressure at a point and its measurements, hydrostatic forces on plane and curved surfaces, buoyancy and floatation.

- **FLUID KINEMATICS** **(04 Hours)**

  Velocity field, classification of fluid flows based on space & time, one-D, two-D and three-D flows. Eulerian and Lagrangian approaches, stream lines, path lines and streak lines, stream tubes, continuity equation, translation, linear deformation, rotation and angular deformation of fluid element, vorticity, rotational and irrotational flow, circulation, velocity potential and stream functions, flow net and its characteristics, local, convective and substantial acceleration of fluid particles.

- **FLUID DYNAMICS** **(09 Hours)**

  Basic theory of Torsion – Solid shaft – Hollow shaft – Power transmitted by shaft – Composite shafts

- **FUNDAMENTALS OF LAMINAR FLOW AND TURBULENT FLOW** **(09 Hours)**

  Reynolds experiment, critical Reynolds number and its determination, boundary layer concept and development of laminar and turbulent flow, laminar flow through pipes and equation for head loss - Hagen-Poiseuille law, velocity distribution in smooth and rough turbulent flows, Darcy-Weisbach equation for turbulent flow through pipe, Moody's diagram in estimation of friction factor.

Total Hours: 57

BOOKS RECOMMENDED:

1. Timoshenko S & Young D H "Elements of Strength of Materials", Tata Mc Graw Hill, New Delhi, 2006
2. Ryder G H, "Strength of Material", English Language Book Society, New Delhi,2006
3. Bhavikatti S S "Strength of Materials", Vikas Publication House, New Delhi, 2007
4. Garde R. J. and Mirajgaoker A. G. "Engineering Fluid Mechanics", NemChand & Bros., Civil lines Roorkee, 2002.
5. Fox W.R. and McDonald, A.T., "Introduction to Fluid Mechanics", Wiley and Sons Inc., New York, 1998.
6. Asawa G L, "Fluid flow in pipes and channels", CBS Publishers, New Delhi.
7. Jain A K, "Fluid Mechanics including Hydraulic Machines", Khanna Publishers, New Delhi, 2000.
8. Streeter V.L., "Fluid Mechanics", McGraw Hill Book Company Ltd., New York. 2003

B.Tech. (Electrical), Semester – IV	L	T	P	C
ME212 : APPLIED THERMODYNAMICS AND THERMAL ENGINEERING	3	0	0	3

- **BASIC CONCEPTS OF THERMODYNAMICS** **(06 Hours)**

  Basic concepts of thermodynamics, system & surroundings, Heat and Work, Reversible and Irreversible process.

- **FIRST LAW OF THERMODYNAMICS** **(07 Hours)**

  The first law for a closed system undergoing a cycle and change of state, Internal energy, enthalpy, specific heat at constant volume and constant pressure. First law of thermodynamics for a control volume, Application of first law to boiler, turbines, compressors.

- **SECOND LAW OF THERMODYNAMICS** **(05 Hours)**

  Heat engines and refrigerators, statements of second law of thermodynamics, and corollaries.

- **INTERNAL COMBUSTION ENGINES** **(06 Hours)**

  Different types study of various systems like cooling, ignition, lubrication etc and numericals.

- **STEAM NOZZLE** **(05 Hours)**

  Different types – condition for maximum discharge – effect of friction-numericals.

- **STEAM TURBINES & CONDENSER** **(07 Hours)**

  Classification: - compounding – Rankin cycle- velocity triangles – blade efficiency, condition for maximum blade efficiency, Governing of turbine – losses in steam turbine – types of condenser – quantity of cooling water required for condenser & Condenser efficiency.

- **GAS TURBINE** **(04 Hours)**

  Different types, working of open & closed type gas turbine Methods used for improving efficiency of turbine.

- **HEAT TRANSFER** **(05 Hours)**

  Basic modes of Heat transfer, conduction in solids, thermal conductivity, Insulating materials, one dimensional steady state conduction problems, free and forced convection, laws of radiation.

Total Hours: 45

BOOKS RECOMMENDED:

1. Wylen Van, Sonntag & Borgnakke, “Fundamentals of Classical thermodynamics” 6th ed. John Wiley & Sons, New York 2003.
2. CENGEL Yunus A. & BOLES MICHAEL A., “Thermodynamics” 4th Ed., Tata Mc Graw Hill, New Delhi, 2004
3. Gorden Rogers & Yon Mayhew “Engineering Thermodynamics” 4th Ed., ADDISON WESLEY, 2004.
4. Simonson John, “Thermodynamics” 4th Ed., Mac Millan 1997.
5. Rajput, “Thermal Engineering”, Laxmi Publication, Dariya Ganj, New Delhi, Edition 2005.

B.Tech. (Electrical), Semester – IV	L	T	P	C
EC212: DIGITAL ELECTRONICS	3	0	2	4

- **NUMBER SYSTEMS AND CODES** **(05 Hours)**

  Addition, Subtraction, Multiplication and Division using Different Number Systems; Representation of Binary Number in Sign-Magnitude, Sign 1's Complement and Sign 2's Complement Notation; Rules for Addition and Subtraction with Complement Reprsentation; BCD, EBCDIC, ASCII, Extended ASCII, Gray and other Codes.

- **BOOLEAN FUNCTION AND ITS MINIMIZATION** **(06 Hours)**

  Simplification of Boolean Function using Boolean theorems; Canonical and Standard Forms(SOP and POS) for Boolean Functions; Objectives of the Minimization Procedures; Karnaugh Map Method;Don't Care Conditions;

- **COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES** **(10 Hours)**

  Half Adder and Full Adder; Half Subtractor and Full Subtractor; Parity Generator and Checker; Code Converters; Carry look ahead generator; Binary Multiplier; Majority Circuits, Magnitude Comparator.

- **COMBINATIONAL LOGIC USING MSI CIRCUITS** **(10 Hours)**

  Binary Parallel Adder; BCD Adder; Encoder, Priority Encoder, Decoder; Multiplexer and Demultiplexer Circuits; Programmable Logic Array (PLA) and Programmable Array Logic (PAL).

- **INTRODUCTION TO FLIP-FLOP CIRCUITS** **(06 Hours)**

  Basic Concepts of Sequential Circuits; Cross Coupled SR Flip-Flop Using NAND or NOR Gates; D-Type and Toggle Flip-Flops JK Flip-Flop & race Condition; Clocked Flip-Flops; Master Slave Configuration; Edge triggered D flip-flop; Elimination of Switch Bounce Using Flip-Flops; Flip-Flops With Preset and Clear.

- **SEQUENTIAL LOGIC CIRCUIT DESIGN & COUNTERS** **(08 Hours)**

  Sequential circuit; state table and state diagram; Design procedure; Basic Concepts of Counters and Registers; Shift Left and Right Register; Registers With Parallel Load; Serial-In-Parallel-Out(SIPO) and Parallel-In-Serial-Out(PISO); Register Using Different Type of Flip-Flops; Ripple(asynchronous) counters; Up Down and Mod-N ripple counters; Design of Synchronous Counter Using State Diagrams and State Table; BCD Counters; Modulo-N Counter; Up Down Counter; Ring counter; Johnson Counter, Sequence Generators

Total Hours: 45

Practical:

1. Half-Adder/Half-Subtractor Circuit using a select input.
2. Full -adder/Full-Subtractor circuit using a select input.
3. 4-Bit Gray to Binary/Binary to Gray code converter using a select input.
4. Logic expression with the help of MUX. IC 74153.
5. Flip-flops using NAND/NOR gate.
6. Modulo-7 ripple counter.
7. 4-bit shift left/right register.
8. Sequence generator.

BOOKS RECOMMENDED:

1. Morris Mano, “Digital Logic And Computer Design”, Prentice Hall Of India, 2005.
2. Jain and Anand : “Digital Electronics”, Practice Using Integrated Circuits, TMH, 2004
3. Charles Kime: “”Logic and Computer Design Fundamentals”, Pearson Education, 2004.
4. Sandige Richard, “Modern Digital Design”, McGraw-Hill, 1990.

B.Tech. (Electrical), Semester – IV	L	T	P	C
EE202 : NETWORK AND SYSTEMS	**4**	**1**	**0**	**5**

- **FOURIER SERIES AND TRANSFORM** **(11 Hours)**

  Dirichlet's conditions, Properties of Fourier series, Trigonometrical and complex exponential forms, the frequency spectra of periodic wave forms, plot of discrete magnitude and phase spectrum, Steady state response to periodic signals, Fourier transforms and its properties, application of Fourier transforms.

- **NETWORK FUNCTIONS AND TWO PORT PARAMETERS** **(11 Hours)**

  Poles and zeros of a function, physical and analytical concepts, terminals and terminal pairs, driving point immittances, transfer functions, restrictions on locations of poles and zeros in S-plane. time domain behavior from pole zero locations in the S plane, procedure for finding network functions for general two terminal pair network, transfer immitances, two port and N-port networks, Ladder, Lattice, Pie, and Tee networks. Definitions, calculations and interrelationships of impedance, admittance, hybrid, and transmission line parameters for two port networks and their interrelations

- **ONE TERMINAL PAIR NETWORKS** **(03 Hours)**

  Reactive networks and their properties, external and internal critical frequencies, separation property for reactive functions and its proof

- **TWO TERMINAL PAIR REACTIVE NETWORKS (FILTERS)** **(11 Hours)**

  Ladder network and its decomposition into tee, pie, and L sections, image impedance, image transfer function and applications to LC networks, attenuation and phase shift in symmetrical Tee and Pie networks, constant K-filters, m-derived filters, composite filters, , lattice filters, Bartlett's bisection theorem. Introduction to the active filters

- **SINUSOIDAL STEADY STATE ANALYSIS** **(08 Hours)**

  Radian frequency and sinusoid, magnitude and phase of network functions, sinusoidal network functions in terms of poles and zeros, resonant circuits, bandwidth and circuit Q, asymptotic change of magnitude and phase of network functions in light of poles and zeros, polar plots and Bode plots of network functions, analysis and applications of symmetrical lattice network.

- **SIGNALS AND SYSTEMS** **(12 Hours)**

  Continuous time and discrete time signals, periodic signals, even & odd signals, exponential and sinusoidal signals, Unit impulse and Unit step functions, Continuous time and Discrete time systems, Basic system properties, Discrete time LTI system, continuous time LTI system, properties of LTI systems, Causal LTI systems described by differential and Difference equations.

Total Hours: 56

BOOKS RECOMMENDED:

1. Van Valkenburg M.E., "Network Analysis", Prentice Hall, India, 3rd Edition, 2002.
2. Oppenheimetal Alan, "Signals & Systems", Prentice Hall India, 2nd Edition, 1998.
3. Edminister Joseph A., "Electrical circuits", Schaum's outline series, McGraw hill, 2nd edition, 1983.
4. Hayt W. H., Kemmerly J. E, Durbin S. M., "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition, 2006.
5. Wadhwa C.L., "Network Analysis & Synthesis", New Age International, Revised 3rd Edition, 2007.
6. Chakarabati A."circuit theory (analysis &synthesis)",Danpat Rai & Co.2004

B.Tech. (Electrical), Semester – IV	L	T	P	C
EE204 : ELECTRICAL MACHINES - II	3	1	2	5

- **DIRECT CURRENT MACHINES** **(09 Hours)**

  Construction, armature windings, simple lap and wave windings, armature reaction, demagnetizing and cross magnetizing ampere-turns, compensating winding, commutation, commutation time and type, reactance voltage, inter-poles, ampere-turns for inter-poles, self and separate excitations, shunt, series and compound motors and generators, magnetization characteristics, performance characteristics of DC generators and motors.

- **STARTING, SPEED CONTROL AND BRAKING OF DC MACHINES** **(06 Hours)**

  Starting problems, methods of starting, starters, methods of speed control, methods of braking.

- **ANALYSIS OF STEADY STATE PERFORMANCE OF DC MACHINE** **(03 Hours)**

  Losses and efficiency calculations.

- **TESTING OF DC MACHINES** **(04 Hours)**

  Swinburn's test, Hopkinson's test, separation of core losses, retardation test, series field test.

- **BRUSHLESS D.C. MACHINES** **(03 Hours)**

  Construction, equivalent circuit, performance analysis.

- **SYNCHRONOUS MACHINES** **(20 Hours)**

  Construction, cylindrical and salient pole type, basic principles, armature windings, distributed winding, full pitched windings, chording, EMF equation, distribution and pitch factors, excitation system, armature reaction, synchronous machine impedance, SCR, equivalent circuit, phasor diagram, voltage regulations, synchronous impedance method, MMF method, ZPF method, operating characteristics, 'V' and inverted 'V' curves, power angle characteristics, power flow equation for salient and non salient pole type synchronous machines, salient pole synchronous machine - two reaction model, phasor diagram, power angle characteristic, hunting, damper winding, parallel operation of alternators, starting methods of synchronous motors, synchronous condenser, synduction machines

Total Hours: 45

PRACTICALS:

1. Speed control of dc shunt motor.
2. Swinburn's test
3. Speed torque characteristic of a D. C. Shunt motor.
4. D. C. Series motor, Speed -torque characteristic.
5. External & Internal characteristics of D. C. separately excited and Shunt generator.
6. Regulation of an alternator by synchronous impedance method
7. 'V' and 'inverted v' curves of a synchronous motor.
8. Regulation of an alternator By zero power factor method
9. Synchronisation of an alternator with infinite busbar.
10. Power factor improvement using synchronous motor.
11. Hopkinson's Test on DC machines.
12. Retardation Test on DC shunt motor.

BOOKS RECOMMENDED:

1. Clayton A. E., "The performance and design of direct current machines", Pitman and sons, London, 1962.
2. Say M. G., "The performance and design of alternating current machines", CBS Publishers and Distributors, Delhi, 1983.
3. Fitzgerald, Kingsley and Umans, "Electric Machinery", TMH, New Delhi, 2003
4. Mukherjee and chakravorty, "Electrical Machines", Dhanpat Rai Pub., New Delhi, 2005
5. Nagrath and Kothari, "Electric Machines", TMH, New Delhi, 2005.
6. P. S. Bimbhra, "Electrical Machinery", Khanna Pub., Delhi, 1998.

B.Tech. (Electrical), Semester – IV	L	T	P	C
EE206 : COMPUTER APPLICATIONS FOR ELECTRICAL ENGINEERING	**3**	**1**	**2**	**5**

The topics given below shall be taught along with stress on computer programming in C language.

- **ERRORS** **(02 Hours)**
  Errors in Numerical Computation, their types and estimation.

- **SOLUTION OF TRANSCENDENTAL AND POLYNOMIAL EQUATIONS** **(08 Hours)**
  Bisection method, Secant Method, Newton Raphson method for Polynomial equation.

- **SOLUTION TO SYSTEM OF LINEAR ALGEBRAIC EQUATIONS** **(08 Hours)**
  Gauss elimination method, Gauss Jordon Method, Gauss Seidal Iteration method.

- **INTERPOLATION** **(10 Hours)**
  Linear interpolation and high order interpolation using Lagrange's and Newton Interpolation methods, Finite difference operators and difference tables.

- **NUMERICAL INTEGRATION** **(06 Hours)**
  Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

- **SOLUTION TO ORDINARY DIFFERENTIAL EQUATIONS** **(10 Hours)**
  Taylor series, Euler's method, Euler's predictor corrector method, Runge Kutta method of Second and Fourth order.

Total Hours: 44

PRACTICALS:

Practice Exercises based on above syllabus.

BOOKS RECOMMENDED:

1. Shastri S. S., "Introductory Methods of Numerical Analysis", Prentice Hall Ltd., 1977.
2. Bajpai A. C., "Numerical Methods for Engineers and Scientists", John Wiley, 1977.
3. Salaria R. S., "Numerical methods : A computer oriented approach", BPB Publications, 1996.
4. Teukolsky, S. A., Vetterling, W. T. & Flannery, B. P., "Numerical recipes in 'C'", 2nd ed., Foundation Books Pvt. Ltd., 2001.
5. Balagurusamy E., "Numerical methods", Tata McGraw-Hill, New Delhi, 2002.