GNITC - Regulation - R18

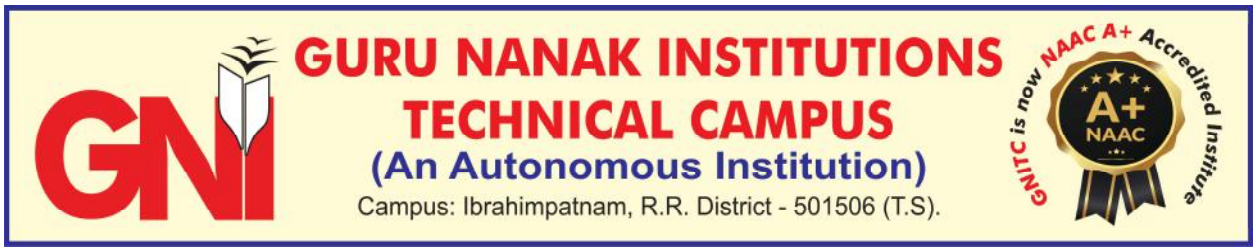
COURSE STRUCTURE AND DETAILED SYLLABUS

for

II YEAR - B.TECH

ELECTRICAL AND ELECTRONICS ENGINEERING

(Applicable for the batches admitted from 2018-19)



Contents

II Year I Semester

II Year II Semester

COURSE STRUCTURE

(Applicable from the batch admitted during 2018-19 and onwards)

SEMESTER-III (SECOND YEAR)

S. No	Group	Course Code	Course Title	Hours per Week			Credits
				L	T	P	
1	ESC	18ES0CE01	Engineering Mechanics	3	1	0	4
2	PCC	18PC0EE01	Electrical Circuit Analysis	3	1	0	4
3	PCC	18ES0EC26	Analog Electronics	3	0	0	3
4	PCC	18PC0EE02	Electrical Machines-I	3	1	0	4
5	PCC	18PC0EE03	Electro Magnetic Fields	3	0	0	3
6	PCC	18PC0EE04	Electrical Machines Laboratory – I	0	0	2	1
7	PCC	18ES0EC27	Analog Electronics Laboratory	0	0	2	1
8	PCC	18PC0EE05	Electrical Circuit Analysis Laboratory	0	0	2	1
9	MC	18MC0CH01	Environmental Science	3	0	0	0
Total Credits							**21**

SEMESTER-IV (SECOND YEAR)

S. No	Group	Course Code	Course Title	Hours per Week			Credits
				L	T	P	
1	BSC	18BS0MA03	Mathematics-III	3	1	0	4
2	PCC	18PC0EE06	Electrical Machines-II	3	1	0	4
3	PCC	18ES0EC28	Digital Electronics	3	0	0	3
4	PCC	18PC0EE07	Control Systems	3	0	0	3
5	PCC	18PC0EE08	Power Systems-I	3	1	0	4
6	PCC	18ES0EC29	Digital Electronics Laboratory	0	0	2	1
7	PCC	18PC0EE09	Electrical Machines Laboratory – II	0	0	2	1
8	PCC	18PC0EE10	Control Systems Laboratory	0	0	2	1
9	MC	18MC0EN01	Constitution of India	3	0	0	0
Total Credits							**21**

II Year B. Tech. EEE I-Sem

L	T	P	C
3	1	0	4

(18ES0CE01) ENGINEERING MECHANICS

Prerequisites: Nil

Objectives: This course helps to solve mechanics problems associated with friction forces and enhance the knowledge of mechanics studied in physics and apply it to the engineering problems. This enables the students to take up further courses in their respective branches.

UNIT – I

INTRODUCTION OF ENGINEERING: MECHANICS – Basic concepts System of Forces- Coplanar Forces – Components in Space – Resultant- Moment of Forces and its Application – Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams-Direction of Force Equations of Equilibrium of Coplanar Systems and Spatial Systems – Vector cross product- Support reactions different beams for different types of loading – concentrated, uniformly distributed and uniformly varying loading .

UNIT – II

FRICTION: Types of friction – Limiting friction – Laws of Friction – Static and Dynamic Frictions – Angle of Friction –Cone of limiting friction– Friction of wedge, block and Ladder, connected bodies**.**

UNIT – III

CENTROID AND CENTER OF GRAVITY: Centroids of simple and composite figures – Center of gravity of flat plate, thin bent bar and wire, composite bodies - Pappus- Guldinus theorems.

UNIT – IV

MOMENT OF INERTIA: Moment of Inertia of areas and masses for standard shapes and composite bodies – Perpendicular axis theorem, Parallel axis theorem, Radius of gyration, Transfer Formula.

UNIT –V

KINEMATICS: Introduction – Rectilinear motion – Motion with uniform and variable acceleration – Curvilinear motion – Components of motion – Circular motion – Projectiles- Instantaneous centre.

KINETICS: Kinetics of a particle – D'Alembert's principle – Motion in a curved path – work, energy and power. Principle of conservation of energy – Kinetics of a rigid body in translation, rotation – work done – Principle of work-energy – Impulse-momentum.

Course Outcomes:

- Student familiarizes with resolving of forces and moments in a given system
- Analyzes the friction of moving bodies
- Understands kinematics and kinetics of rigid bodies
- Carries out experimental mechanics of materials
- Students have the knowledge of material and structures and they integrate the science, engineering and mathematical concepts.

TEXT BOOKS:

1. Engineering Mechanics (Statics and Dynamics) by NH Dubey, Mcgraw Hill, reprint, July 2017.
2. Engineering Mechanics by Fedrinand L. Singer / Harper International 53rd edition 2010.

REFERENCES:

1. Engineering Mechanics (Statics and Dynamics) by Hibbler; Pearson Education, 14th Edition, 2015.
2. Engineering Mechanics by A. K. Tayal, Umesh Publication, 2010.
3. Engineering Mechanics – G. S. Sawhney, Printice Hall of India, 2010.
4. A text book of engineering mechanics by R. K. Bansal; Laxmi publications, 2015.

II Year B. Tech. EEE I-Sem

L	T	P	C
3	1	0	4

(18PC0EE01) ELECTRICAL CIRCUIT ANALYSIS

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Apply network theorems for the analysis of electrical circuits.
- Obtain the transient and steady-state response of electrical circuits.
- Analyse circuits in the sinusoidal steady-state (single-phase and three-phase).
- Analyse two port circuit behaviours.

UNIT I: Network Theorems

Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Node and Mesh Analysis. Concept of duality and dual networks.

UNIT II: Solution of First and Second order networks

Solution of first and second order differential equations for Series and parallel R-L, R-C, R- L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response.

UNIT III: Three-phase circuits and Coupled circuits

Three-phase circuits: Phase sequence – 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.
Coupled circuits: Mutual coupled circuits, Dot Convention in coupled circuits,

UNIT IV: Electrical Circuit Analysis Using Laplace Transforms

Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots), series and parallel resonances

UNIT V: Two Port Network and Network Functions

Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

Text Books:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.

Reference Books:

1. W. H. Hayt and J. E. Kemmerly, “Engineering Circuit Analysis”, McGraw Hill Education, 2013.
2. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.
3. K. V. V. Murthy and M. S. Kamath, “Basic Circuit Analysis”, Jaico Publishers, 1999.

II Year B. Tech. EEE I-Sem

L	T	P	C
3	0	0	3

(18ES0EC26) ANALOG ELECTRONICS

Course Objective:
To provide the knowledge of working of transistors, rectifiers, amplifiers, oscillators and design of OP-AMP based circuits

Course Outcomes:
At the end of this course, students will demonstrate the ability to
1. Understand the characteristics of transistors.
2. Design and analyze various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.

UNIT I: Semiconductor Diodes and circuits
n-type and p-type semiconductors, P-N junction diode, bias of P-N junction, I-V characteristics of a diode; operation of diode, three diode models, Analysis of half-wave and full-wave rectifiers, Characteristics and Analysis of Zener diode, Operation of diode limiting and clamping circuits.

UNIT II: Transistor Characteristics and Biasing
Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits

UNIT III: Differential, multi-stage and Tuned amplifiers
Differential amplifier; Types of Differential amplifiers; Characteristics and Analysis of Differential Amplifiers, Cascade amplifiers, coupling of amplifiers, RC coupled, direct coupled, and transformer coupled amplifiers, Darlington amplifier, bootstrapping, tuned and double tuned amplifiers.

UNIT IV: Operational Amplifiers and Linear Circuits
Ideal and Practical OP-AMP,AC and DC Characteristics; Internal block diagram of an operational amplifier, OP-AMP Symbol, OP-AMP Equivalent Circuit, Open-loop and Closed loop Concepts, Negative feedback concepts, OP-AMP Operating modes; Adder, Subtractor, instrumentation amplifier, Differentiator, Integrator, Basic Comparator, Regenerative Comparator.

UNIT V: Applications of op-amp
Active Filters,1st order LPF, HPF, BPF, Band Stop Filter and All pass filter, Criterion for oscillations, Wien Bridge and RC Phase shift oscillators, Specifications of DAC and ADC, Weighted Resistor type DAC, R-2R Ladder type DAC, Inverted R-2R Ladder type DAC, Successive Approximation ADC, Parallel Comparator type ADC, Dual slope ADC

Text Books:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.

Reference books:

1. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
2. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
3. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

II Year B. Tech. EEE I-Sem

L	T	P	C
3	1	0	4

(18PC0EE02) ELECTRICAL MACHINES-I

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of magnetic circuits.
- Understand the operation of dc machines.
- Analyse the differences in operation of different dc machine configurations.
- Analyse single phase and three phase transformers circuits.

UNIT I: Electromagnetic force and torque

B-H curve of magnetic materials; flux-linkage vs current characteristic of magnetic circuits; linear and nonlinear magnetic circuits; energy stored in the magnetic circuit; force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element. Examples - galvanometer coil, relay contact, lifting magnet, rotating element with eccentricity or saliency

UNIT II: DC machines

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

UNIT III: DC machine - motoring and generation

Armature circuit equation for motoring and generation, Types of field excitations - separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. V-I characteristics and torque-speed characteristics of separately excited, hunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines

UNIT IV: Transformers – I

Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses

UNIT V: Transformers - II

Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers, Autotransformers - construction, principle, applications and comparison with two winding transformer, Magnetizing current, effect of nonlinear B-H curve of magnetic core material, harmonics in magnetization current, Phase conversion - Scott connection, three-phase to six-phase conversion, Tap-changing transformers - No-load and on-load tap-changing of transformers, Three-winding transformers. Cooling of transformers.

Text Books:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw hill, 2010.

Reference Books:

1. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
2. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.
3. M. G. Say, “Performance and design ofAC machines”, CBS Publishers, 2002.

II Year B. Tech. EEE I-Sem

L	T	P	C
3	0	0	3

(18PC0EE03) ELECTRO MAGNETIC FIELDS

Course Outcomes:

At the end of the course, students will demonstrate the ability

- To understand the basic laws of electromagnetism.
- To obtain the electric and magnetic fields for simple configurations under static conditions.
- To analyse time varying electric and magnetic fields.
- To understand Maxwell's equation in different forms and different media.
- To understand the propagation of EM waves.

This course shall have Lectures and Tutorials. Most of the students find difficult to visualize electric and magnetic fields. Instructors may demonstrate various simulation tools to visualize electric and magnetic fields in practical devices like transformers, transmission lines and machines.

UNIT I: Review of Vector Calculus

Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.

UNIT II: Static Electric Field

Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT III: Conductors, Dielectrics and Capacitance

Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations.

UNIT IV: Static Magnetic Fields

Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors. Magnetic Forces, Materials and Inductance Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic circuits, inductances and mutual inductances.

UNIT V: Time Varying Fields and Maxwell's Equations

Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Boundary Conditions.

Text Books:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

Reference Books:

1. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
2. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
3. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.

II Year B. Tech. EEE I-Sem

L	T	P	C
0	0	2	1

(18PC0EE04) ELECTRICAL MACHINES LAB-I

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and speed control of DC shunt motor. Predetermination of efficiencies.
8. Brake test on DC compound motor. Determination of performance curves.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Brake test on DC shunt motor. Determination of performance curves.
10. Retardation test on DC shunt motor. Determination of losses at rated speed.
11. Separation of losses in DC shunt motor.

II Year B.Tech. EEE I-Sem

L	T	P	C
0	0	2	1

(18ES0EC27) ANALOG ELECTRONICS LABORATORY

(For Laboratory Examination – Minimum of 6 experiments in part A and in part B)

PART A:

1. Forward and Reverse Bias V-I characteristics of PN junction Diode.
2. Zener diode V-I characteristics and Zener diode as voltage regulator.
3. Half Wave rectifier and Full wave rectifier with filters.
4. Input and output Characteristics of a BJT in CE configuration
5. Input and output Characteristics of a BJT in CE configuration.
6. FET characteristics in CS configuration.
7. Frequency response of CE Amplifier.

PART B:

1. Inverting and Non-inverting Amplifiers using Op Amps.
2. Comparators using Op Amp.
3. Integrator Circuit using IC 741.
4. Differentiator circuit using Op Amp.
5. Summing and Subtractor circuit using op amp.
6. To draw the frequency response of Ist order LPF.
7. To draw the frequency response of Ist order HPF

II Year B. Tech. EEE I-Sem

L	T	P	C
0	0	2	1

(18PC0EE05) ELECTRICAL CIRCUIT ANALYSIS LAB

The following experiments are required to be conducted as compulsory experiments

1. Time response of first order RC / RL network for periodic non – sinusoidal inputs – Time constant and Steady state error determination.
2. Two port network parameters – Z – Y parameters, Analytical verification.
3. Two port network parameters – A, B, C, D parameters, Analytical verification
4. Current locus diagram with RL with R – varying.
5. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Co-efficient of Coupling.
6. Verification of Compensation and Millman's theorem.
7. Relation between voltage and current in star and delta networks.
8. Verification of Thevenins theorem and Norton's theorem

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

9. Current locus diagram with RL with L – varying
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
11. Determination of form factor for non-sinusoidal waveform

II Year B. Tech. EEE I-Sem

L	T	P	C
3	0	0	0

(18MC0CH01) ENVIRONMENTAL STUDIES

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

I Year B. Tech. EEE II-Sem

L	T	P	C
3	1	0	4

(18BS0MA03) MATHEMATICS-III

Course Objectives

1. To learn the Concepts & properties of Random variables and Probability distributions
2. To learn the concepts of correlations and regressions.
3. To understand Concepts & properties of the testing of hypothesis for large & small samples.
4. To provide basic concepts of Complex functions and Properties.
5. To learn the basics of Conformal & Bilinear Transformations.

Course Outcomes

At the end of the course, the student will be able to:

1. Identify the random variables involved in the probability models.
2. Calculate the Correlation and linear regression for a given data set.
3. Applying various statistical tests in testing of hypotheses on the given data.
4. Evaluation of integrals by using Cauchy's integral theorem & formula
5. Understanding the concepts of Conformal & Bilinear transformations.

UNIT-I: Random variables and probability distributions.

Random variables – Discrete and continuous. Probability distributions, mass function/ density function of a probability distribution. Mathematical Expectation, Moment generating function of probability distribution. Binomial, Poisson & normal distributions and their properties.

UNIT-II: Multiple Random variables, Correlation & Regression

Joint probability distributions- Joint probability mass / density function, Marginal probability mass / density functions, Covariance of two random variables, Correlation -Coefficient of correlation, the rank correlation, Regression- Regression Coefficient, The lines of regression.

UNIT-III: Sampling Distributions and Testing of Hypothesis

Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variances, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variances.

Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, and Level of significance. One sided test, Two sided test,

Large sample tests: Test of Equality of means of two samples equality of sample mean and population mean.

UNIT-IV: Functions of Complex Variables

Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, and Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method.

Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula

UNIT – V: Conformal mapping.

Power series expansions of complex functions: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity. Residues– Residue theorem.

Conformal mapping: Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection, Transformations like e^z , log z, z^2, and Bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given.

Suggested Text/Reference Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

II Year B. Tech. EEE II-Sem

L	T	P	C
3	1	0	4

(18PC0EE06) ELECTRICAL MACHINES-II

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of rotating magnetic fields.
- Understand the operation of ac machines.
- Analyse performance characteristics of ac machines.

UNIT I: Fundamentals of AC machine windings

Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single- turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, Sinusoidally distributed winding, winding distribution factor

UNIT II: Pulsating and revolving magnetic fields

Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, Magnetic field produced by a single winding - fixed current and alternating current Pulsating fields produced by spatially displaced windings, Windings spatially shifted by 90 degrees, Addition of pulsating magnetic fields, Three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

UNIT III: Induction Machines

Construction, Types (squirrel cage and slip-ring), Torque Slip Characteristics, Starting and Maximum Torque. Equivalent circuit. Phasor Diagram, Losses and Efficiency. Effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency). Methods of starting, braking and speed control for induction motors. Generator operation. Self-excitation. Doubly-Fed Induction Machines.

UNIT IV: Single-phase induction motors

Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and applications.

UNIT V: Synchronous machines

Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation. Operating characteristics of synchronous machines, V-curves. Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.

Text Books:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.

Reference Books:

1. E. Fitzgerald and C. Kingsley, "Electric Machinery” McGraw Hill Education, 2013.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
3. P. C. Sen, “Principles of Electric Machines and Power Electronics”, John Wiley & Sons, 2007.

II Year B.Tech. EEE II-Sem

L	T	P	C
3	0	0	3

(18ES0EC28) DIGITAL ELECTRONICS

Course Objective:

1. The student shall understand concepts of digital logic and design of logic circuits involving combinational and sequential logic.
2. To learn the process of A/D and D/A data conversion and PLD applications.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1.Understand working of logic families and logic gates.
2.Understand techniques of Minimization of Boolean functions
3.Design and implement Combinational and Sequential logic circuits.
4.Understand the process of Analog to Digital conversion and Digital to Analog conversion.
5.Be able to use PLDs to implement the given logical problem.

UNIT 1: Number Systems and logic families

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT 2: Minimization of Boolean functions & Combinational logic design

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT 3: Sequential circuits and systems

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-TAndD types flipflops, applications of flipflops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flipflops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT 4: A/D and D/A Converters

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT 5: Semiconductor memories and Programmable logic devices.

Memory organization and operation, expanding memory size, classification And characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Text Books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Reference Book:

1. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

II Year B. Tech. EEE II-Sem

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(18PC0EE07) CONTROL SYSTEMS

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the modelling of linear-time-invariant systems using transfer function and state-space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.

UNIT I: Introduction to control problem

Industrial Control examples. Mathematical models of physical systems. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra, Transfer Function of Servo motor (AC&DC) Synchro transmitter and Receiver, Representation by Signal flow graphs.

UNIT II: Time Response Analysis

Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second-order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

UNIT III: Frequency-response analysis

Relationship between time and frequency response, Frequency domain specifications Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin.

UNIT IV: Introduction to Controller Design

Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design. Design specifications in frequency-domain. Frequency-domain methods of design. Application of Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs.

UNIT V: State variable Analysis

Concepts of state variables. State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. State Transition Matrix and it's Properties. Concept of controllability and observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems

Text Books:

1. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997.
2. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009.

References Books:

1. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.
2. K. Ogata, "Modern Control Engineering", Prentice Hall, 1991.

II Year B. Tech. EEE II-Sem

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(18PC0EE08) POWER SYSTEMS-I

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concepts of power systems.
- Understand the various power system components.
- Evaluate fault currents for different types of faults.
- Understand the generation of over-voltages and insulation coordination.
- Understand basic protection schemes.
- Understand concepts of HVDC power transmission.

UNIT I: Basic Concepts

Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids. Generation: Conventional and Renewable Energy Sources. Distributed Energy Resources. Energy Storage. Transmission and Distribution Systems: Line diagrams, transmission and distribution voltage levels and topologies (meshed and radial systems). Synchronous Grids and Asynchronous (DC) interconnections. Review of Power Transfer in AC circuits and Reactive Power.

UNIT II: Power System Components

Overhead Transmission Lines and Cables: Electrical and Magnetic Fields around conductors, Corona. Parameters of lines and cables. Capacitance and Inductance calculations for simple configurations. Travelling-wave Equations. Sinusoidal Steady state representation of Lines: Short, medium and long lines. Power Transfer, Voltage profile and Reactive Power. Characteristics of transmission lines. Surge Impedance Loading. Series and Shunt Compensation of transmission lines. Loads: Types, Voltage and Frequency Dependence of Loads. Per-unit System and per-unit calculations.

UNIT III: Over-voltages and Insulation Requirements

Generation of Over-voltages: Lightning and Switching Surges. Protection against Over- voltages, Insulation Coordination. Propagation of Surges. Voltages produced by traveling surges. Bewley Diagrams.

UNIT IV: Fault Analysis and Protection Systems

Method of Symmetrical Components (positive, negative and zero sequences). Balanced and Unbalanced Faults. Representation of generators, lines and transformers in sequence networks. Computation of Fault Currents. Neutral Grounding.

UNIT V: Introduction to DC Transmission

DC Transmission Systems: Line-Commutated Converters (LCC) and Voltage Source Converters (VSC). LCC and VSC based dc link, Real Power Flow control in a dc link. Comparison of ac and dc transmission.

Text Books:

1. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education, 1994.
2. O. I. Elgerd, "Electric Energy Systems Theory", McGraw Hill Education, 1995.

Reference Books:

1. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
2. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill Education, 2003.
3. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.

II Year B.Tech. EEE II-Sem

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(18ES0EC29) DIGITAL ELECTRONICS LABORATORY

Hands-on experiments related to the course contents of EE07.

1. To study and verify the truth table of logic gates.
2. To realize half and full adder.
3. To realize half and full subtractor.
4. To study and verify the truth table of BCD to excess-3 code converter and vice versa.
5. To convert given binary numbers to gray codes and vice versa.
6. To verify the truth table of multiplexer using IC 74153 and de-multiplexer using IC 74139.
7. To verify the truth table of multiplexer and de-multiplexer using NAND gates.
8. To verify the truth table of one bit and two bit comparator using logic gates.
9. To verify the truth table of the following flip flop
   (a) JK Master Slave (b) D-type (c) T-type
10. To store a set of data in a RAM using IC 2114

II Year B. Tech. EEE II-Sem

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(18PC0EE09) Electrical Machines Lab-II

The following experiments are required to be conducted as compulsory experiments

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. Scott connection of transformers
4. No-load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three-phase alternator by synchronous impedance & m.m.f. methods
6. V and Inverted V curves of a three-phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of Xd and Xq of a salient pole synchronous machine

In addition to the above eight experiments, at least any two of the following experiments are required to be conducted from the following list

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Efficiency of a three-phase alternator
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
7. Measurement of sequence impedance of a three-phase alternator.
8. Performance characteristics of a Schrage motor

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(18PC0EE10) CONTROL SYSTEMS LAB

Any Eight of the following experiments are to be conducted

1. Time response of Second order system
2. Characteristics of Synchro's
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Transfer function of DC generator
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor

Any two simulation experiments are to be conducted using software tools

1. Simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis).
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system.
4. State space model for classical transfer function– Verification.

Reference Book

1. Manuals of related software.

II Year B. Tech. EEE II-Sem

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(18MC0EN01) CONSTITUTION OF INDIA

Course Objective:

The course is structured and taught to enable a non social science students to appreciate and understand the evolution of the institutions and dynamics of functioning of the institutions. This constitutes itself as political process and affects and effects the individual and the society in its life as a person and citizen and develops and forms an attitude towards the political system. The main aim is to help individuals develop into responsible, critical, reflective and productive citizens.

Course outcome:

It facilitates the understanding of various Government of Indian acts their provisions and reforms. It helps to know the salient features in making of Indian constitution and appreciate the constitutional principles and institutional arrangements and makes them learn about the fundamental rights and duties and the directive principle of state policy. It inculcates skills to evaluate the evolution, functioning and consequences of political parties in India and to identify how electoral rules and procedure in India effect election outcomes.

Unit-I Evolution of Indian Constitution

1. Constitutionalism
2. 1909, 1919 and 1935 Acts
3. Constituent Assembly- Composition and Functions

UNIT-II Major features and Provisions

1. Salient features
2. Fundamental Rights and Duties
3 Directive Principles of State Policy

Unit-III Constitutional Institutions

1. Union Government-Executive (President, Prime Minister and Council of Ministers)
   - Legislature (Parliament - Loksabha, Rajyasabha)
   - Judiciary- Supreme Court and High Court
2. State Government-Executive (Governor, Chief Minister and Council of Ministers)
   - Legislature (Legislative Assembly and Legislative Council)
3. Panchayat Raj institutions and Urban local bodies

Unit- IV Federalism

- Union – State relations(Legislative, Administrative and Financial)
- Politics of federal governance and Frictions in Federal polity

Unit-V Political Process

1. Political Parties-National and Regional
2. Pressure groups
3. Civil Society and Popular movements
4. Election Commission of India

Reading List:

1. D. D. Basu (2015) Introduction to the Constitution of India, New Delhi: LexisNexis.
2. Peu Gosh (2018) Indian Government and Politics, Delhi, PHI Pvt Ltd
3. Granville Austin (1999), The Indian Constitution – Corner Stone of a Nation, New Delhi: Oxford.
4. P.M.Bakshi (2018), The Constitution of Indi-LexisNexis, Delhi