

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-II (Electronics & Communication Engg.)

Semester - V

Digital Circuits I

Communication Engineering

Electrical Power System I

Electrical Machines III

Control System I

Electrical Measurements & Instruments-I

VEER NARMAD SOUTH GUJARAT UNIVERSITY

B.E.-III (Electrical Engg.)

Semester - V

ECE 501 ELE Digital Circuits

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	0	Continuous Evaluation 20 Examination 30

NUMBER SYSTEMS :-

Decimal number system; Binary, octal and hexadecimal number systems Conversion from one number to another number system; 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 representation; BCD, EBCDIC, ASCII, Extended ASCII, Gray and other codes.

LOGIC GATES AND BOOLEAN ALGEBRA :-

AND, OR, NOT, NAND, NOR, EX OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; Demorgan's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean functions; SOP and POS forms; Realization of Boolean functions using only NAND and OR gates.

BOOLEAN FUNCTION MINIMIZATION :-

Objectives of the minimization procedures; Karnaugh map method; Don't care conditions; Quine-McCluskey tabulation method; concept of prime implicants.

COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES :-

Half adder and full adder; Half subtractor and full subtractor; parity generator and checker; Code converters; Binary multiplier; Majority circuits, magnitude comparator.

COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS :-

Binary parallel adder; BCD adder; Encoder, priority encoder, decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and multiplexer; Arithmetic and logic unit; BCD to seven-segment decoder; Common anode and common cathode 7-segment display; Random access memory, Read only memory and erasable programmable ROMS; Programmable logic array (PLA) and programmable array logic (PAL).

INTRODUCTION TO SEQUENTIAL LOGIC CIRCUITS :-

Basic concepts of sequential circuits; Cross coupled SR flip-flop using NAND or NOR gates; J-K flip-flop rise condition; Clocked flip-flop; D-type and toggle flip-flops; Truth tables and excitation tables for flip-flops; Master slave configuration; Edge triggered and level triggered flip-flops; Elimination of switch bounce using flip-flops; Flip-flops with preset and clear.

SEQUENTIAL LOGIC CIRCUIT DESIGN :-

Basic concepts of counters and registers; Binary counters; BCD counters; Up down counter; Johnson counter, module-n counter; Design of counter using state diagrams and table; Sequence generators; 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-flop; Sequence generator.

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ECE 502 ELE Communication Engineering

	Lecture	Tutorial	Practical
Teaching Hours	3	0	0
Examination Scheme Marks	100	0	Continuous Evaluation 00 Examination 00

Signals & Noise :-

Wave form spectra, audio signals, frequency range for speech and music, intensity of sound, sound distortion, thermal noise, shot noise, partition noise, flicker noise, h.f. noise, signal to noise ratio, noise factor.

Electronic Communication circuits :-

Tuned RF amplifiers, neutralization, frequency conversion and mixers, IF amplifiers and broad band video amplifiers, Class C amplifiers, tuned oscillators, super hetrodyne receivers, automatic gain control, SSB receivers.

Modulation Theory :-

Amplitude modulation, SS modulation, angle modulation, pulse modulation, amplitude demodulator, frequency discriminator.

Digital Communication :-

Bit transmission, signalling rate, error probability, digital filtering, PCM, delta modulation coding, error detection.

Satellite Communication :-

Introduction, orbits, station keeping, satellite altitude, transmission path, path loss, noise loss, noise considerations, satellite system, saturation flux density, effective isotropic radiated power, multiple access methods.

Fiber Optic Communication :-

Introduction, principles of light transmission in a fiber, losses in fiber, dispersion, light sources for optical fibers, photo detectors, connectors and splices.

TV and Radars :-

Introduction to TV Engineering, fundamentals of TV transmission and reception, color picture tube, radar engineering and radio aids to navigation.

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ELE 503 ELE Electrical Power Systems I

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme Marks	100	25	Continuous Evaluation 00 Examination 00

Supply systems :-

AC and DC power supply systems, comparison of ac and dc transmission, advantages of high transmission voltage, various systems of power supply, comparison of conductor materials in overhead system and underground cables system, economic choice of conductor size and economic choice of voltage.

D.C. and A. C. distribution :-

Types of dc distributors, dc distribution calculations, dc distributor fed at one and fed at both the ends with concentrated loads and uniformly distributed loads, ring dc distributors with inter connectors, current distribution in three wire dc systems, balancers in three wire dc systems, boosters, ac distribution calculations, methods of solving ac distribution problems.

Mechanical aspects of overhead lines :-

Main components of over head lines, conductor materials, line supports, insulators, types of insulators, potential distribution over suspension insulators, string efficiency, methods of improving string efficiency, corona, factors affecting corona, important terms, advantages and disadvantages of corona, sag in over head lines and sag calculations.

Underground cables :-

Underground cables, construction of cables, classification of cables, cables for three phase services, insulation resistance of a single core cables, capacitance of a single core cable, dielectric stresses in a single core cables, most economical conductor size in a cables, grading of cables, capacitance grading and inter-sheath grading, capacitance of three core cable and measurements of capacitances.

Electrical design of overhead lines :-

Conductors, types of conductors in use, bundled conductor, spacing of conductors, symmetrical and unsymmetrical spacing, equivalent spacing, transposition, transmission line constants, calculation of resistance, inductance and capacitance for simple arrangements and multi-circuit lines, symmetrical and unsymmetrical spacing, concept of self G.M.D. and mutual G.M.D. and their uses in calculations of parameters of overhead lines, skin effect.

Characteristics and performance of power transmission lines :-

Short and medium transmission lines :

Line performance, effect of capacitance, charging currents, short and medium lines, calculation by nominal-T, nominal-p and end - condenser method, regulation and efficiency.

Long transmission lines :

Concept of ABCD constants, the long transmission line- rigorous solution, evaluation of ABCD constants, interpretation of long line equation, surge impedance and surge impedance loading, the equivalent circuit of a long transmission line, power flow through a transmission line, circle diagrams, Farrenti effect, tuned power lines. Methods of voltage control : Importance of voltage control, location of voltage control equipment, methods of voltage control, excitation control, voltage regulators, tap changing transformers, booster transformers, induction regulators, reactive power injection and voltage control by synchronous condenser.

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ELE 504 ELE Electrical Machines III

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation 20 Examination 30

Magnetic Circuits :-

Properties of magnetic materials, A.C. excitation, permanent magnets and their applications.

Electromechanical Energy Conversion Principles. :-

Forces and torques in magnetic field systems, energy balance, energy and forces in singly excited magnetic field systems, co-energy function and determination of magnetic force/torque, multiply excited magnetic field systems, forces and torques in systems with permanent magnets, Energy conversion via electrical field., dynamic equations, analytical techniques, linearisation.

Rotating Machines review :-

Of ac and dc machines, MMF of distributed windings of a.c. machines and d.c. machines, magnetic fields in rotating machines with machines of uniform and non uniform air gaps, rotating MMF waves in a.c machines, graphical analysis of polyphase MMF, generated voltages for a.c and d.c machines, torques in non salient pole machines : coupled circuit and magnetic field viewpoint, linear machines, magnetic saturation , leakage fluxes.

Variable Reluctance Machines :-

Analysis, practical VRM configurations, current waveforms and torque production, VRM drives, nonlinear analysis.

Fractional and Sub fractional kW motors :-

Single phase induction and synchronous motors: starting and running performances, split phase motors, capacitor type motors, shaded pole motors, self starting reluctance motors, hysteresis motors, revolving field theory of single phase induction motors, unbalanced operation of symmetrical two phase machines: symmetrical component concept, series universal motors, stepping motors, permanent magnet d.c motors, permanent magnet a.c. motors.

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ELE 505 ELE Control Systems I

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation 20 Examination 30

MATHEMATICAL BACKGROUND-LAPLACE TRANSFORMS:

Laplace Transform of Common Functions; Laplace Transform Theorems; Inverse Laplace Transforms; Solution of Linear Differential Equations Using Laplace Transform

INTRODUCTION TO CONTROL SYSTEM ANALYSIS:

Introduction; Open-Loop And Closed Loop Systems; Basic Components of Control Systems; Examples of Control Systems; Transfer Function; Block Diagram; Block Diagram Reduction; Signal Flow Graph- Mason's Gain Formula; Feedback And Its Effects on System Performance.

MATHEMATICAL MODELLING OF DYNAMIC SYSTEMS:

Linear Versus Nonlinear Systems; Mechanical Translational And Rotational Systems; Electrical Systems- Complex Impedances, Operational Amplifiers- Inverter, Scale Changer, Summer, Integrator, Simulation of Transfer Functions And System Differential Equations; Analogous Systems- Force-Voltage Analogy and Force-Current Analogy; Representation of Gear Train and Transformer; Error Detectors-Potentiometers, Synchronizers, Differential Transformers; Magnetic Amplifiers-Basic Principle, Series and Parallel Connections, Magnetic Amplifier with Auto Self Excitation and with Feedback, Applications; Rotating Amplifiers-Basic Principle, Transfer Function, Applications; Servo Motors- Field Controlled and Armature Controlled DC Servomotors, Two Phase AC Servo Motors; Modulators and Demodulators; DC And AC Tachogenerators; DC and AC Position Control Servosystems; Stepper Motor; Gyroscope; Liquid Level Systems; Thermal Systems; Robot Arm Systems; Pneumatic Systems; Hydraulic Systems.

TIME DOMAIN ANALYSIS OF CONTROL SYSTEMS:

Typical Test Signals; Response Of First Order Systems; Transient Response of a Second Order System with Step Input; Time Domain Specifications of a Second Order System; Impulse and Ramp Response of a Second Order System; Proportional-Plus-Derivative Control of a Second Order System; Routh's Stability Criterion; Steady State Errors; Static Error Constants; Error Series And Dynamic Errors Coefficients.

FREQUENCY DOMAIN ANALYSIS OF CONTROL SYSTEMS:

Steady State Response of A System Due to Sinusoidal Input; Frequency Response; Logarithmic Plots or Bode Diagrams; Log-Magnitude Versus Phase Plots; Resonant Peak and Resonant Frequency of a Second Order System; Polar Plots; Nyquist Stability Criterion; Stability Analysis; Relative Stability; Gain Margin and Phase Margin; Closed Loop Frequency Response; M-Circles and N-Circles; . Nichol's Chart.

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ELE 506 ELE Electrical Measurements & Instruments-I

	Lecture	Tutorial	Practical
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Continuous Evaluation Examination 20 30

Standards:

Standards and their classification, electrical standards: emf., current, resistance, inductance, and capacitance.

Potentiometers:

Construction, theory, analysis, standardization and applications of d.c. and a.c. potentiometers, constant resistance deflectional potentiometer, error and their remedies, VR box.

Measurement of Resistance:

Classification of resistances, measurement of low resistance by Kelvin's bridge, measurement of medium resistance: precision measurement with Wheatstone's bridge, Carey Foster Slide wire bridge, measurement of high resistance: direct deflection method, loss of charge method, megaohm bridge, and meggar, measurement of surface resistivity, measurement of Earth resistance, construction and theory of d.c. galvanometer.

Measurement of inductance and capacitance :

Measurement of inductance by 3V and 3A method general 4 arm a.c. bridge network, theory ; vector diagram; merits and demerits of Maxwell's; Hay's; Anderson's ; De sauty's ; Schering and Wien's bridge network, errors and methods of their reduction in bridge measurements, detectors : headphone and vibration galvanometer with its theory and construction.

Magnetic measurements :

Theory and calibration of Ballistic galvanometer, use of it for measurement of flux, Grassot flux meter : construction; theory and application, hall effect devices, measurement of iron losses : wattmeter method and a.c. bridge method.

Indicating and integrating instruments :

Classification, operating principles, general constructional details of indicating instruments, balancing , control and damping, theory and construction of PMMC; moving iron; electrostatic; induction and rectifier instruments, possible errors and their reduction, theory and construction of electrodynamic wattmeter, methods of wattmeter connections, errors in power measurement, theory; construction; error adjustments; and calibration of induction type energy meter, principles at p.f. meter and frequency meter.

Instrument Transformers :

Theory of current and potential transformers, ratio error and phase angle, use of CT/PT for extension of instruments range, testing at CT/PT : Biffi's method; shotter's null method and clothier – Medina method