# Department of Electrical & Electronics Engineering

**B.Tech. in ELECTRICAL & ELECTRONICS ENGINEERING**

Course Structure (Applicable to 2011-12 admission onwards)

<table>
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<tr>
<th>Yr</th>
<th>Subject Code</th>
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<td>ELE 202</td>
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COURSE CONTENTS
THIRD SEMESTER

MAT 203 ENGINEERING MATHEMATICS III [4 0 0 4]
(Common for Electrical stream - BM / E&C / E&E / ICE)
Complex Variables: C-R equations, conformal mappings, bilinear transformation. Taylor's and Laurent Series, Residues, Fourier Series, PDE, derivation and solution of wave equation and heat equations.
Numerical Methods; Interpolation and extrapolation; Vector Calculus, Gradient, divergence and curl, Line, surface and volume integrals, Related theorems

References:
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI

ELE 201 ELECTRICAL CIRCUIT ANALYSIS [3 1 0 4]
Network theorems: Superposition, Reciprocity, Thévenin’s, Norton’s, Substitution, Compensation, Maximum power transfer, and Millman’s theorems; Locus diagrams: Impedance, admittance and current loci of series and parallel circuits; Signals and waveforms: Classification of Signals, elementary signals, characteristics, representation of waveforms; Translators in RL, RC, RLC circuits, Initial and final conditions, time domain specification, State variable representation of circuits; Laplace transforms – definition, properties, initial and final value theorems, inverse, Laplace transform of standard signals, periodic waveforms, transform circuits, analysis of networks by Laplace transform method, network functions, poles and zeros, convolution Integral; Two-port network: Two-port parameters, z-, y-, T- and h-parameters, relationship between parameters, inter-connection of two-port networks, ladder networks.

References:
2. Kuo, F.F., Network Analysis and Synthesis (2e), Wiley, 1999
3. Van Valkenberg, Network Analysis (3e), PHI, 1990

ELE 203 DIGITAL ELECTRONIC CIRCUITS [3 1 0 4]
Number Systems and Codes: Binary arithmetic, Logic gates and Boolean algebra, De Morgan’s theorem, Combinational logic circuits: representation and simplification of logic expressions - Karnaugh map, variable entered mapp; Quine-McCluskey algorithm, realization using logic gates; Combinational circuit design using Multiplexers; demultiplexers; encoders; decoders; Arithmetic circuits, ALU; Sequential logic circuits: Memory cell, Latches & Flip-flops, excitation tables, Ripple counters; Shift registers; Finite state machines, Classification of FSM, analysis and design of FSM; linked state machines; Logic families and their characteristics.

References:
ELE 205  ELECTRICAL MACHINERY – I [3 1 0 4]
Transformers: types, principle, equivalent circuit, O.C and S.C. tests, losses, efficiency and regulation, All-day efficiency, polarity test, Sumner's test, Cooling, Inrush current phenomenon. Parallel operation, tap changers, Auto-transformers; Connection of single phase transformers for three phase operation, Scott connection, Open delta, three-phase to six phase conversion, Harmonics, Three winding transformer.
Three phase induction motors: types, principle, equivalent circuit, windings design, no-load test, blocked rotor tests, circle diagram, cogging and crawling, induction generator, starting; deep bar and double cage motors. Speed control methods - voltage, frequency, rotor resistance, slip power recovery schemes, doubly fed machines.
D.C. Generators: Construction, principle of operation, emf equation, types, winding design, armature reaction, commutation, characteristics; D.C. Motors: Principle of operation, types, torque equation, characteristics speed control, starters, testing.

References:
3. Claydon and Hancock, Performance and Design of DC Machines (3e), O&BG, 1978

ELE 207  ELECTROMAGNETIC THEORY [3 1 0 4]

References:
1. Hayt W., Engineering Electromagnetics (7e), TMH, 2006
2. Kraus J. D., Electromagnetics (4e), MGH, 1992

ELE 209  ANALOG ELECTRONIC CIRCUITS [3 1 0 4]

References:

ELE 211  ELECTRICAL CIRCUITS LABORATORY [0 0 3 1]
Module II: Electric circuit simulation using PSpICE - Steady state & transient analysis of DC & AC circuits.

References:
2. Rashid M. H., PSpice for circuits and Electronics using PSpICE, PHI, 1986

ELE 213  INTEGRATED ELECTRONICS LABORATORY – I [0 0 3 1]
Module I: Design, Simulate and Test basic analog electronic circuits using diodes such as clipping/clamping/ rectifier without and with capacitor filter - Fixed and variable voltage power supplies, Zener diodes, voltage regulators using 78XX, 79XX, LM317 - Biasing and Stability Studies of circuits – Frequency response of Amplifier Circuits.
Module II: Design and Testing of combinational circuits using gates, multiplexers, decoders, arithmetic circuits etc. – Design
and Testing of sequential digital electronic circuits such as counters, shift registers & sequence generators, sequence detectors etc.

References:
2. David Bell, Electronic Devices and Circuits, 5e, Oxford University Press

ELE 204 ELECTRICAL MACHINERY – II [3 1 0 4]
Synchronous machines: Constructional features, e.m.f. equation, suppression of harmonics, Armature reaction; Effect of power factor on armature reaction - Non-salient pole alternator: Synchronous Impedance, O.C. and S.C. characteristics – Power input & power output, voltage regulation.
Synchronisation: Parallel operation of two alternators, Governor characteristics, alternator connected to infinite bus, Salient pole alternator: Two reaction theory, Blondel's diagram, Phasor diagram, voltage regulation, slip test power angle characteristics.
Synchronous motors: Principle of operation, power input and power developed, performance characteristics, O-curve and V-curve, inverted V curve, synchronous condenser, methods of starting - Synchronizing power: Synchronizing power and torque, hunting, periodicity of hunting, damping - Design of electrical machines: Design of main dimensions of transformer & rotating machines – Design of field pole of dc machine & alternator.

References:

ELE 206 DIGITAL SYSTEM DESIGN & COMPUTER ARCHITECTURE [3 1 0 4]
Digital implementation options; Comparison based on performance & cost, Design flow – Digital system Modeling: Domains – behavioural, structural, physical, levels of abstraction, high level, RTL level and logic synthesis, HDL – VHDL: Entity and architectures, behavioural, data-flow and structural Modeling, sequential and concurrent constructs, VHDL styles for synthesis, Design case studies; Architecture of Programmable ASICS; Reconfigurable computing.
Introduction to Computer Architecture; Instruction Set Architecture, Components of a CPU, Instruction formats, Opcode encoding techniques, Instruction Types and Addressing modes, Reduced Instruction Set Computers. Pipelining, I/O interfacing, Interrupts; Memory Organisation: Memory cells, Memory hierarchy, Datapath design: General Register design, Arithmetic units, Control path design: Hardwired and Micro-programmed.

References:
1. C.H. Roth, Digital system design using VHDL, PWS, 1998
2. David Harris and Sarah Harris, Digital Design and Computer Architecture, Elsevier/Morgan Kaufman, 2008

ELE 208 ANALOG SYSTEM DESIGN [3 1 0 4]
Feedback amplifiers using BJT and FET - Operational Amplifier architecture - transfer characteristics of op.amp, offset voltage and current, slew rate limitations, inverting amplifier, non inverting amplifier, summing amplifier, voltage follower, integrator, differentiator, voltage to current converter, current to voltage converter, difference amplifier, instrumentation amplifier

Active filters: Universal Active filter, Biquad configuration for LPF, HPF, BP, BRF, design of first and higher order low pass, high pass, band pass and band elimination and all pass active filters, Voltage controlled filter, Self tuning filters, Switched capacitor filters

Non-linear applications of operational amplifier: Precision half wave and full wave rectifiers, peak detector, sample and hold circuit, log and antilog amplifiers, analog multipliers, comparators, Schmitt trigger, square wave, triangular wave generators and pulse generator, astable and multivibrator using 555 timer, voltage controlled oscillator, phase-locked loops and applications

References:

ELE210 ELECTRICAL MACHINERY LABORATORY - I [0031]
OC and SC tests on single phase transformer - Sumpner's test - Polarity tests and connection of single phase transformers as three phase bank - Parallel operation of two single phase transformers - Scott connection of transformers - Open delta connection - Study of harmonics in - transformers, tertiary winding - Study of starters for three phase induction motor & DC Motor - No load & blocked rotor tests on three phase IM - Load test on three phase squirrel cage IM - Study of torque-alia characteristics by varying rotor resistance - Load test on Induction generator - Magnetization characteristics of DC M/c.

ELE212 INTEGRATED ELECTRONICS LABORATORY- II [0031]
Module I: Design, Simulation and Testing of operational amplifier based circuits.
Module II: Digital circuit design using VHDL - Functional simulation/timing simulation and synthesis of the combinational and sequential circuits using VHDL simulator and testing on FPGA demo boards - Combinational circuit design - Sequential circuit design - Implementation of state machines for applications like traffic light control, vending machine etc.

References:

FIFTH SEMESTER

ELE301 LINEAR CONTROL THEORY [3 1 0 4]

References:

ELE303 DIGITAL SIGNAL PROCESSING [3 1 0 4]
Review of time-domain and frequency domain properties of discrete-time signals and systems, Discrete Fourier series, Discrete-time Fourier transform, Sampling in time and frequency domain - Discrete Fourier Transform, Properties of DFT, Linear convolution using DFT; Fast Fourier Transform algorithms.Digital Filters: FIR and IIR filters, characteristics , Digital filter structures, FIR filter design: Window method, Frequency sampling method, Optimal FIR design; IIR filter design: Impulse invariant and bilinear transformation methods, Classical filter design using Butterworth and Chebyshev approximations, Frequency transformation technique for HP, BP and BS filter design, Direct design of IIR filters; Real time implementation of DSP algorithms.

References:
3. Mitra S.K., DSP: A computer based approach (2a), TMH, 2006
ELE 305 COMMUNICATION SYSTEMS [3 1 0 4]

Elements of an Electrical Communication System, Communication Networks - Analog Communication Systems - Principles of Amplitude modulation, double and single side band, suppressed carrier system, AM circuits, AM Transmitters and Receivers, Angle modulation, Frequency modulation, FM receivers, Digital Communication: Sampling theorem, pulse modulation techniques - PAM, PWM and FFM concepts, FCM encoder and decoder, Multiplexing - TDM ,FDM - Data communication techniques: Data transmission using analog carriers, MODEMS employing FSK, PSK, DPSK, QPSK, and QAM, error control coding techniques - Multiple Access Techniques, Microwave links, Satellite communication systems, Optical communication systems, Digital Telephony, Wireless Communication, Mobile Telephony, GSM and CDMA standards

References:
1. Thomas W., Electronics Communications systems, Pearson, 2001

ELE307 GENERATION, TRANSMISSION AND DISTRIBUTION [3 1 0 4]


References:
2. Wadhwa C.L., Electrical Power System (3e), New Age Intl., 2000
3. S.N.Singh, ,Electric Power Generation ,Transmission and Distribution', PHI,

ELE 309 POWER SYSTEM ANALYSIS [3 1 0 4]


References:

ELE 311 MICROCONTROLLER BASED SYSTEM DESIGN [3 1 0 4]


References:
3. Preckso, Programming and customizing the 8051 Microcontroller, TMH.

ELE 313 ELECTRICAL MACHINERY LAB-II [0 0 3 1]

Load test on dc shunt and compound generators - Speed control of D.C. shunt motor by (i) Armature voltage control (ii) Flux control.

ELE 315 MICROCONTROLLER & EMBEDDED SYSTEMS LABORATORY [031]

Introduction to 8051 simulation software and familiarization of 8051 Microcontroller Kit - Data Transfer, Arithmetic and logic operation programs - Array handling - Code conversion programs - Bit manipulation and programming using I/O ports - Timer/Counter programming - Monitor routines for keyboard and display - Programming 8051 trainer kit in serial mode and interrupt programs - Interfacing peripherals - 8255, ADC, DAC & Waveform generation - Interfacing a Stepper motor interface & Elevator interface - Interfacing logic controller & traffic light with 8051.

References:


SIXTH SEMESTER

HSS 302 ESSENTIALS OF MANAGEMENT & ENGINEERING ECONOMICS [3104]


References:


ELE 304 POWER ELECTRONICS [3104]

Power Semiconductor devices: SCR, Triac, GTO, BJT, Power MOSFET, IGBT - characteristics, safe operating area, device rating, base/gate drive requirements, Converter Topologies: Controlled Rectifiers: Single phase converters - half wave, half controlled and fully controlled bridge converters, Three-phase Converters - half controlled & fully controlled bridge, triggering sequence, operation, effect of source inductance, Line commutated inverters, Dual converters, AC to AC converters: Cycloconverters and AC voltage regulators, DC - DC Converters: Step down and step up operation, Classification of choppers, DC - AC Converters: Single phase and three phase bridge inverters, Square wave operation, PWM Inverters - PWM techniques, harmonics in output voltage, Multi level inverters, Space vector modulation, Resonant converters: Principle of soft switching - concept of zero current switching and zero voltage switching.

References:


ELE 306 MEASUREMENTS AND INSTRUMENTATION [3104]

Basic concepts of measurements - System configuration, calibration - Errors in measurements: Measuring instruments: Permanent magnet moving coil; Moving iron; and Electrodynamometer type Applications - Measurement of Resistance, Inductance & Capacitance: A.C. Bridges-

References:

ELE 308 MEASUREMENTS AND INSTRUMENTATION LAB [0 0 3 1]
Design & Implementation of measurement systems on microcontroller platform - Sensing power signals - Sensing ECG signal - Realisation of instruments such as volt meter, ammeter, wattmeter.
Design & Realisation of common analog signal conditioning blocks using Analog System Design starter kit - ASLK x 2010 - Study of ADC & DAC - Real time data acquisition, measurement & monitoring on Virtual Instrumentation platform.

References:

ELE 310 SYSTEM SIMULATION LABORATORY [0 0 3 1]
Mathematical models & time domain analysis of continuous and discrete-time systems - Stability Analysis of continuous time and discrete time systems - Controller design in s-domain and z-domain - Design of state feedback controllers and observers using pole placement technique.
Modeling with SIMULINK - Analysis of simple systems using SIMULINK, armature voltage control of DC motors - Familiarization of graphical design tools.

References:

SEVENTH SEMESTER

ELE 401 SWITCHGEARS AND PROTECTION [3 1 0 4]

References:

ELE 403 SOLID STATE DRIVES [3 1 0 4]
Electric drives - Components, dynamics, multi-quadrant operation, equivalent moment of inertia, equivalent torque, Components, nature and classification of load torque, Steady state stability, Load equalization, Electric Traction, DC Drives单-phase converter fed, Three-phase converter fed, Dual converter fed and Chopper fed DC drives, AC Drives-Induction motor drives, Stator voltage control, static rotor resistance control, Slip power recovery scheme, Frequency control - Constant torque, constant power operation, Field-oriented control, Direct torque & flux control, Synchronous motor drives - Permanent magnet synchronous machine control, Synchronous reluctance machine control, current vector control, Wound field synchronous machine drives, brushless DC excitation, Load commutated inverter drives, Switched reluctance motor drives, Power conditioners and un-Interruptible power supplies.

References:

ELE 405 ILLUMINATION TECHNOLOGY [3 1 0 4]
discharge - Construction - principle of operation - Luminous
efficacy - Lamp life & Colour characteristics - Luminaire: optical
characteristics of light control elements - C.I.E. classification -
Applications of various light control elements - measurements
using GONIO photometer - Evaluation of total luminous flux -
Quantity and Quality of Illuminance - Artificial illumination design
techniques : Lumen method of calculations - IES glare index
computation method - Flood lighting of buildings - Road lighting
- Energy conservation measures in illumination systems.

References:
2. Jack L. Lindsey., Applied Illumination Engineering (2e), Fairmont
   Press, INC 1997
3. Durrant D.W, Interior lighting design (5e), Lighting industry
   federation Ltd., 1977.

ELE407 POWER ELECTRONICS AND DRIVES
LABORATORY [0031]
SCR characteristics - Measurement of latching and holding current -
Study of Commutation circuits - Resonant commutation, Complimentary
commutation and Auxiliary commutation - AC - DC converters - Speed
control of D.C. motor - Speed control of Induction motor - DC - DC
Converters using IGBT / MOSFET - Power electronic circuit simulation
using PSPICE.

ELE409 ADVANCED ENERGY SYSTEMS LABORATORY
[0031]
Module I: Photometric measurements - Measurement of
spectrum & colour characteristics - Performance of SPV panels -
Power Quality Analysis - Lighting system with lighting controls
and Interfacing modules - Practice of Lighting software for design
applications.

Module II: Introduction to Power System Simulators - Load flow
analysis - transient stability - dynamic stability - short circuit
studies for multi machine systems - relay coordination - load
frequency control - Relay characteristics.

Module III: Introduction to PLC based Control - Study of P, PI,
PD, PID characteristics using Controller trainer kits.

References:
1. IS: 10322(PART4) – 1984, IS: 10322(PART5/SEC3) – 1987, IS:

ELE411 SEMINAR [0031]
- Each student has to present a seminar, on any technical
  topic not covered in the syllabus. The presentation time is a
  minimum of 30 minutes followed by a 10 minutes session for
discussion/ question & answers.
- The seminar topic selected by the student must be
  approved by the authorized faculty of the department at
  least two weeks in advance.
- Each student has to submit to the department a seminar
  report at least three days before the day of seminar.
- Each student has to make the presentation with LCD
  projector.

EIGHTH SEMESTER

ELE 402 INDUSTRIAL TRAINING/ TOUR [0001]
- Each student has to undergo industrial training for a
  minimum period of 4 weeks. This may be taken in a phased
  manner during the vacation starting from the end of third
  semester.
- Student has to submit to the department a training/tour
  report in the prescribed format. The report should include
  the certificates issued by the industry.
- Students who opt for industrial visit should visit a minimum
  of ten industries and submit the report.
- Student has to make the presentation on the industrial
  training/visits

ELE 499 PROJECT WORK / PRACTICE SCHOOL
[00020]
- The project work may be carried out in the institution/
  industry/ research laboratory or any other competent
  institutions.
- The duration of the project work shall be a minimum of 16
  weeks which may be extended up to 24 weeks.
- A mid-semester evaluation of the project work shall be done
  after about 8 weeks.
- An interim project report on the progress of the work shall be
  submitted to the department during the mid-semester
  evaluation.
- The final evaluation and viva-voice will be conducted after
  submission of the final project report in the prescribed form.
- Student has to make a presentation on the work carried out,
  before the departmental committee as part of project
  evaluation.
ELE 320 COMPUTATIONAL TECHNIQUES IN POWER SYSTEM ANALYSIS [3 1 0 4]


References:

ELE 322 RENEWABLE ENERGY SOURCES [3 1 0 4]


References:

ELE 324 APPLICATIONS OF DSP [3 1 0 4]


References:

ELE 326 VLSI DESIGN - I [3 1 0 4]

MOS Devices and circuits - Device operation, input-output characteristics, second order effects - device modeling, spice parameters - Inverter - Transfer characteristics, switching characteristics, delay models, super buffers, Pseudo NMOS Inverter - Performance optimization - Fan-In, Fan-out, Power dissipation, layout, area, speed - CMOS fabrication process - VLSI Yield and economics - CAD tools for Layout and functional simulation - MOSFET logic gates - Pass transistors and transmission gates - Implementation of Boolean functions and combinational circuits - Pseudo NMOS Inverter - Flip flops, shift registers and clocked sequential circuits, memory (ROM and RAM). Stick diagrams, Design rules and layouts, Scaling of MOS circuits - Analog VLSI Design; Issues, Challenges, Small signal modeling and analysis of MOSFET, single stage amplifiers, Current mirrors, sources and sinks, differential amplifier and single stage opamp.

References:

ELE 328 SOFTWARE COMPUTING [3 1 0 4]


Familiarization with MATLAB Fuzzy logic & neural network...
Toolbox

References:

ELE 330 EMBEDDED SYSTEMS [3104]


References:
1. Raj Kamal, Embedded systems, TMH 2003
2. Frank Vahid & Tony Givargis, Embedded system Design, Wiley India, 2002

ELE 421 POWER SYSTEM OPERATION AND CONTROL [3104]

Generator & voltage control system: Energy conversion, application to synchronous machines, park's transformation, voltage & mechanical equations, synchronous operation, steady state model, simplified dynamic model, generator connected to infinite bus - Exciter system block diagrams, generator models, stability of excitation systems. Voltage regulation, generator with excitation system connected to infinite bus, small signal stability analysis - Load frequency control, single area systems, speed governing system, static response characteristics, closed ALFC loops, static & dynamic response, secondary ALFC loops, two area system, Reactive power and voltage control - Generation & absorption of reactive power, methods of voltage control, performance requirements of transmission lines, uncompensated lines, voltage & current profiles, power/voltage characteristics, reactive power requirements, principles of transmission system compensation, series & shunt compensation - Introduction to facts controllers - Economic load dispatch & unit commitment

References:
1. R. Bargan, Vijay vital, Power system analysis, (2e), prentice Hall

ELE 423 ENERGY AUDITING AND MANAGEMENT [3104]


References:

ELE 425 BUILDING AUTOMATION SYSTEMS [3104]


References:

ELE 427 VLSI Design-II [3104]

Arithmetic Building blocks-logic design and circuit
considerations, power and speed trade-offs - High performance MOS logic families - Dynamic logic - Performance comparison of high performance logic families with static CMOS - Timing issues in digital circuits - Timing analysis - setup time, hold time, slack calculations, clock skew and maximum operating frequency calculations - Global set up and global hold time calculations - Limitations, pipelining.


References:


ELE 429 DATA STRUCTURES & ALGORITHMS [3104]

Analysis of algorithms - Stacks - application to evaluation of postfix expressions, conversion from infix to postfix representation - Queues - Sequential representation, operations, priority queues, and array implementation Linked Lists - Trees - Graphs - Sorting - Searching - Greedy techniques - Prim's & Kruskal's algorithms for minimum spanning trees, shortest paths, optimal tape storage, job scheduling with deadlines, Knapsack problem - Divide and Conquer - General technique, maximum and minimum, multiplying long integers, Strassen's matrix multiplication, finding the closest pair of points - Dynamic programming - matrix chain ordering, all pairs shortest paths, optimal BST - Backtracking - NP completeness -Introduction to parallel algorithms.

References:

1. Cormen, Leiserson and Rivest, Introduction to algorithms, MGH 2001

ELE 431 ADVANCED CONTROL SYSTEMS [3104]

Control system performance objectives - Design of cascade compensators for continuous time and discrete time control systems - Feed back compensation - Design using Nichols chart - Industrial PID controllers - state space systems and PID control - Automatic PID controller tuning - pole placement techniques for design of controllers and observers - design of integral controllers - Robust control - H techniques - Non-linear control system design - Linearization - Describing function - use of describing function to predict oscillations - compensation and design of non-linear systems - Phase plane analysis - analysis - Introduction to optimal control theory and applications - Characteristics of optimal control problem - Calculus of variation - Dynamic programming - Pontryagin's maximum principle - application Control system design examples - Control system design using Toolboxes.

References:


ELE 433 HVDC AND FACTS [3104]

Basics of power transmission networks - Control of power flow in AC systems - Analysis of uncompensated AC line-passive compensation - FACTS controllers - Basic types, Equivalent circuit & Benefits, Configuration, operation and control of SVC, STATCOM,TCSC, SSSC, TCPSR & UPFC.

DC power transmission - Types - components used, Choice of converter configuration, Converter bridge characteristics, HVDC system control - Converter control characteristics - modifications, System control hierarchy, Firing angle control - IPC, EPC, current and extinction angle control, starting and stopping of DC link - Converter faults and protection - DC breakers - characteristics and types.

References:


ELE 435 UTILIZATION OF ELECTRICAL ENERGY [3104]

Traction - Traction Drives - dc and ac traction drives, dc and ac traction using power semiconductor controlled drives, dc and ac traction employing polyphasic ac motors, diesel electric traction - Electroplating: Preparation of work for electroplating, Electro - extraction and refining of copper and aluminum, Electrolysis of water - Electric Welding - Resistance welding: spot, seam, butt, projection and flash welding, Power supply, Arc welding, characteristics of arc, Carbon arc and metallic arc welding, Coated electrodes, Control of current in welding transformers - Electric Heating: Classification of heating equipments, Methods of heat transfer, Resistance heating, resistance ovens, Design of heating element, Temperature control, Induction heating, Core type furnace, Coreless Induction furnace, indirect induction oven, High frequency eddy current heating, Dielectric heating,
Arc furnaces.

References:

ELE 437 INDUSTRIAL AUTOMATION AND CONTROL [3 1 0 4]


References:
1. Sawney A.K., A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Sons, 2005
2. Dubey G.K., Power Semiconductor Controlled Drives, PHI, 1989

ELE 439 INTEGRATED LIGHTING DESIGN [3 1 0 4]


References:

ELE 441 DATABASE MANAGEMENT SYSTEMS [3 1 0 4]

Database systems - Concepts overview, terminologies, data models - Physical data organization - B-tress, files with dense and sparse index, files with variable length records, look-up on non-key attributes, partial match retrieval, range queries - Network model: DEFTG DLL, implementation, operation such as insertion, deletion and modification - Hierarchical model - Implementation - Hierarchical model architecture, data definition and manipulation in hierarchical database - Relational Model - Storage Organization, relational algebra, relational calculus, relational query language, overview of SEQUEL, QUEL, QBE - Design theory for relational database, functional dependencies, decomposition of relational scheme, normalization - Database protection integrity and security, concurrent operations on database.

References:

ELE 443 HIGH VOLTAGE ENGINEERING [3 1 0 4]


References:

ELE 445 POWER QUALITY ISSUES [3 1 0 4]

Power Quality Issues - Standards and indices - Voltage sags -

References:

ELE 447 DISTRIBUTED ENERGY RESOURCES [3 1 0 4]

References:

ELE 449 SPECIAL ELECTRICAL MACHINES [3 1 0 4]

References:

ELE 455 MODERN POWER CONVERTERS [3 1 0 4]
Switched Mode Power Converters: generalized comparison between switched mode and linear D.C. regulators, operation and steady state performance of buck, boost, buck-boost and cuk converters, continuous conduction mode, discontinuous conduction mode, D.C - D.C Converters with isolation - Fly-back converter, forward-converter, push-pull converter, half bridge and full bridge D.C-D.C converters; Resonant Converters - series and parallel loaded converters in continuous and discontinuous mode of operation, zero current switch resonant
ELE 340 ENERGY CONVERSION TECHNOLOGIES [3 0 0 3]


References:
3. J.D. Edwards, Electrical Machines and Drives, Macmillan, UK 1991

ELE 342 RENEWABLE ENERGY SOURCES [3 0 0 3]


References:

ELE 344 ANALOG AND DIGITAL ELECTRONIC CIRCUITS [3 0 0 3]

(Not offered to Electrical stream)

Operational amplifiers and applications - dc voltage follower, bridge amplifier, integrator, differentiator, low pass, high pass and band pass active filters, precision diode and clamp, log - antilog amplifiers, astable, monostable and triangular wave generators, Schmitt Trigger, analog multiplier - Phase locked loop and applications - Phase comparator, Voltage controlled Oscillator, Functional block Schematic of PLL, PLL applications in communication - Number systems - Conversions between Number Systems - Subtraction using 1’s and 2’s. Complements – Karnaugh maps, Logic gates - Truth tables, Realization of Boolean functions using Gates, Universal Gates - Msi combinational circuits - Half and Full adders, magnitude comparator, Decoder, Encoder, Multiplier, ROM, PLA - Sequential circuits - Flip Flops – Synchronous and Asynchronous Counters, Design of counters, 74194 Shift Register IC based design.

References:
2. Ramakant A. Gayakward, "Op-Amps and Linear Integrated Circuits" Prentice Hall of India

ELE 346 ELECTRICAL ENERGY SYSTEMS [3 0 0 3]


References:
ELE 348 ELECTRIC DRIVES [2103]

Electric Drives - Components of electric drives, factors affecting choice of drives, dynamics of electrical drives, fundamental torque equation, speed-torque conventions, multi-quadrant operation of electric drives, load torque components, nature and classification of load torque, equivalent moment of inertia, steady state stability, load equalization - Motor power rating, thermal model, classes of motor duty - Introduction to thyristors, characteristics, power converters: AC to DC, DC to AC, DC to AC - DC Drives Systems - characteristics, starting, speed control, braking - AC Drive Systems: characteristics, starting, speed control, braking - Closed loop motor control schemes - Constant Torque, Speed, Position control systems.

References:
1. Dubey G. K., Fundamentals of Electric Drives (2a), Narosa, 2001
2. De N. K. and Sen P. K., Electric Drives, PHI, 1999

ELE 350 INDUSTRIAL AUTOMATION AND CONTROL [3003]


References:
1. Sawney A.K., A course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Sons, 2005
2. Dubey G. K., Power Semiconductor Controlled Drives, PHI, 1989

ELE 352 ENERGY AUDITING & MANAGEMENT [3003]


References:

ELE 354 MICROPROCESSORS AND MICROCONTROLLERS [3003]

(Not offered for Electrical stream)


References: