

- 01205211** Electric Circuit Analysis I 3(3-0-6)
 Definitions. Basic concepts and units. Circuit elements. Resistive circuits. Dependent sources. Circuit theorem and analysis. Node and mesh analysis. Network theorem. Graph theory. Energy storage elements. First order and second order circuits. Sinusoidal signal. Phasor diagram. Alternating current steady-state analysis. AC power circuits. Three-phase circuits.
- 01205212** Electric Circuit Analysis II 3(3-0-6)
 Prerequisite : 01205211
 Complex frequency and s-plane analysis. Network function. Frequency response. Laplace transformation and its application to circuit analysis. Resonance and scaling circuits. Coupled circuits. Transformer. Two-port networks.
- 01205213 Electric Circuit Laboratory 1(0-3-2)
 Prerequisite : 01205211
 Laboratory experiments on topics covered in Electrical Circuit Analysis I.
- 01205216 Computer Programming for Electrical Engineers 3(3-0-6)
 Computing concepts. Structured program development. Flows control functions. Arrays. Pointers. Characters and strings. Formatted input/output. File processing. Stacks. Queues. Linked lists. Tree structures. Searching. Sorting.
- 01205217** Electrical Engineering Mathematics 3(3-0-6)
 Prerequisite : 01417168
 Matrices and systems of linear equations. Vector spaces. Orthogonality. Orthogonalization. Inner product spaces. Linear transformation. Eigenvalues and eigenvectors. Diagonalization. Applications to optimization problems in electrical engineering. Numerical analysis. Numerical methods for linear algebra. Applications of numerical methods in electrical engineering.
- 01205221** Telecommunication Engineering 3(3-0-6)
 Elements of communications system. Telephone network. Traffic engineering. Analog and digital signal. Pulse code modulation. Transmission. Data rate. Transmission media. Mobile communications. Satellite communications. Optical communications. Power line communications.

Data communications

01205231**	<p>Electronic Circuits and Systems I Prerequisite : 01205211</p> <p>Semiconductor devices. Current-voltage and frequency characteristics of electronic devices. Analysis and design of basic electronic circuits including diodes, bipolar junction transistors and field-effect transistors. Transistor bias circuits and transistor small signal analysis. Basic amplifiers. Operational amplifiers and its applications in linear and nonlinear circuits. Multistage transistor amplifiers.</p>	3(3-0-6)
01205232	<p>Digital Circuits and Logic Design</p> <p>Number systems and codes. Boolean algebra. Combinational logic design principles and practices. Logic design by using Karnaugh map. Sequential logic design principles and practices. Logic design by using state machine. Synchronous and asynchronous sequential logic design. Various families of digital integrated circuits. Programmable logic devices. Interfacing with analogue circuits. Introduction to computer aid design for digital logic design.</p>	3(3-0-6)
01205251	<p>Electromechanical Energy Conversion I Prerequisite : 01205211</p> <p>Energy sources. Magnetic circuits. Principles of electromagnetic and electromechanical energy conversion. Energy and co-energy. Principles of rotating machines. DC machines. Starting method of DC motors. Methods of DC motors speed control. AC machines. Theory and analysis of single phase and three phase transformers.</p>	3(3-0-6)
01205252*	<p>Introduction to Electric Power Systems Prerequisite : 01205211</p> <p>Physics of electricity. Basics of alternating-current power. Basic concepts of electric generators. Electric loads. Power transmission and distribution. Overview of power system performance including reliability, security, stability, and power quality. Concepts of power system operation and planning. New technologies in power systems.</p>	3(3-0-6)
01205291	<p>Electrical Practice</p> <p>Workshop practice in basic electrical equipment and in wiring installation.</p>	1(0-3-2)

- 01205311** Signals and Systems 3(3-0-6)
Prerequisite : 01205212 or together
Continuous-time and discrete-time signals and transform analysis techniques. Linear and time-invariant systems. Transfer functions. Fourier series. Fourier transform. Laplace and z transform. Sampling theorem. Solution of differential and difference equations using transforms. Applications of signals and systems. Modern techniques in signal and system analysis.
- 01205312** Applied Probability for Electrical Engineers 3(3-0-6)
Prerequisite : 01417168
Axioms of probability. Conditional probability. Independent events. Independent trials. Discrete random variables. Continuous random variables. Expectation. Functions of a random variable. Conditional distribution. Conditional expectation. Pairs of random variables and their joint distribution. Function of two random variables. Independent random variables. Random vectors. Moment generating functions. Sum of independent random variables. The Central Limit Theorem.
- 01205314 Digital Signal Processing 3(3-0-6)
Discrete-time signals and systems. Fourier transform and discrete Fourier transform. Z transform. Sampling of continuous time signal. Transform analysis of linear time-invariant systems. Structures for discrete-time systems. Digital signal processing applications.
- 01205321** Principles of Communications 3(3-0-6)
Prerequisite : 01205311 and 01205312
Introduction to signal and systems. Spectrum of signal and applications of Fourier Series and transform. Analog modulation, AM, DSB, SSB, FM, NBFM, and PM. Noise in analog communications. Nyquist's sampling theory and Quantization. Binary baseband modulation. Pulse analog modulation. Pulse code modulation (PCM). Delta modulation (DM). Multiplexing. Time-division multiplexing (TDM). Introduction to transmission lines, radio wave propagation, microwave components and satellite communications, optical communications.
- 01205327** Data Communications and Networks I 3(3-0-6)
Introduction to data communications and networks. Layered network architectures. Point-to-point protocols and links. Delay models in data networks. Multi-access communications. Routing in data networks. Data

flow controls. Data security.

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| 01205332 | Electronics Laboratory
Prerequisite : 01205231
Laboratory experiments on topics covered in Electronic Circuits and Systems I. | 1(0-3-2) |
| 01205335** | Microprocessor
Prerequisite : 01205232
Introduction to microprocessors. Structure of microprocessors. Assembly programming. Interface techniques. Memories. Input-output interfaces. Applications of microprocessors in instrumentation systems. Applications of microprocessors in automation systems. | 3(3-0-6) |
| 01205341** | Electromagnetic Fields and Waves I
Prerequisite : 01417267
Vector analysis. Electrostatic fields. Potential and energy. Conductors and dielectric. Capacitance. Convection and conduction currents. Solution of Laplace's and Poisson's equations. Magnetostatic fields. Inductance. Displacement current. Time-varying electromagnetic fields. Maxwell's equations. | 3(3-0-6) |
| 01205344** | Microwave Engineering
Prerequisite : 01205341
Maxwell's equations and boundary conditions. Transmission-line theory. S parameters. Smith charts. Impedance matching. Microwave transmission lines and waveguides. Microwave resonators and filters. Microwave network analysis. Power dividers and directional couplers. Microwave systems and applications. Microwave measurements. | 3(3-0-6) |
| 01205352 | Electromechanical Energy Conversion Laboratory I
Prerequisite : 01205251
Laboratory experiments on topics in Electromechanical Energy Conversion I and parts of Electromechanical Energy Conversion II and other related topics. | 1(0-3-2) |
| 01205361** | (Electrical Measurements and Instruments)
Prerequisite : 01205231
Units and standards of electrical measurements. Instrument classifications and characteristics. Measurement analysis. Measurement of | 3(3-0-6) |

DC and AC current and voltage using analog and digital instruments. Power, power factor and energy measurements. Measurements of resistance, inductance, and capacitance. Frequency and period/time-interval measurements. Noises. Transducers.

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| 01205362** | Linear Control Systems
Prerequisite : 01205212 | 3(3-0-6) |
| | Mathematical models of systems. Closed-loop and open-loop control systems. Transfer functions. Signal flow graphs. Time-domain and frequency domain analysis and design of control systems. Root-locus. Nyquist plots. Bode plots. System stability. Introduction to state-space representations. | |
| 01205399* | Internship | 1 |
| | Internship for Electrical Engineering in private enterprises, government agencies, government enterprises or academic places at least 240 hours and at least 30 workdays in order to get experiences from the assignment. | |
| 01205425 | Visual Communications
Prerequisite : 01205321 | 3(3-0-6) |
| | Fundamental of visual communication and television. Information theory. Models of human vision system. Bilevel image coding. Transform image coding. Video formation and representation. Video sampling. Video coding and motion estimation. Scalable video coding. Video compression standards. Stereo and multi-view sequence processing. Error control in video communications. Video over internet and wireless networks. | |
| 01205426** | Digital Communications
Prerequisite : 01205321 | 3(3-0-6) |
| | Review of the sampling theorem. Probability and random processes. Line coding and pulse shaping. Signal detections. Digital modulation techniques. Performance analysis. Introduction to information theory. Source coding. Channel coding. Introduction to synchronization. Interesting modern digital communication topics. | |
| 01205428 | Wireless Communications
Prerequisite : 01205321 | 3(3-0-6) |
| | Fundamentals of wireless communication systems. Cellular concepts and cellular system design fundamentals. Mobile radio propagation. Large scale path loss. Small scale fading and multipath. Modulation techniques. Spread spectrum and commercial wireless system standard. | |

01205429	Satellite Communications Prerequisite : 01205321 Theory and practice of satellite communications. Orbital aspects. Modulation and multiplexing. Coding. Multiple access techniques. Satellite link design. Propagation effects. Earth terminals and very small aperture terminal networks.	3(3-0-6)
01205442**	Antenna Engineering Prerequisite : 01205341 Basic definitions and theorems. Formulation of radiation problems. Isotropic point sources. Power and field patterns. Directivity and gain. Radiation impedance. Wave polarization. Radiation from current elements. Radiation properties of wire antennas. Linear array antennas. Uda-Yagi antennas and log-periodic antennas. Aperture antennas. Smart antennas. Microstrip antennas. Antenna measurements.	3(3-0-6)
01205447**	Optical Fiber Communications Prerequisite : 01205321 and 01205341 Cylindrical dielectric waveguides and propagating conditions. Structures and types of optical fiber. Optical fiber parameters. Optical fiber production. Signal degradation in optical fibers. Optical sources. Modulation techniques. Optical detectors. Optical receivers. Optical repeaters and amplifiers. Optical components. Link budget calculations.	3(3-0-6)
01205491	Electrical Engineering Project I Select and prepare interesting project in electrical engineering.	1(0-3-2)
01205497	Seminar Presentation and discussion on current interesting topics in electrical engineering at the bachelor's degree level.	1
01205499	Electrical Engineering Project II Prerequisite : 01205491 Continuing the same project as in electrical engineering project I.	2(0-6-3)