



T.C. MARMARA UNIVERSITY
TECHNICAL EDUCATION FACULTY
ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

FRESHMEN - First Semester

ELK 111 CIRCUIT ELEMENTS AND MEASUREMENT LABORATORY - I (Theory:3, Lab.:4, Credit:5)

Introduction to circuit components, unit systems, description and importance of measurement ,accuracy and precision in measurement ,types of errors, active and passive circuit components , measurement devices and classification of its and related laboratories.

Laboratory experiments: Measurement faults. Measurement inductance of coils. Arrangement of serial and parallel ohmmeter and their scale. Measurement of battery resistance by voltmeter method. Measurement of small value resistance by comparison method. Measurement of mutual inductance. Detecting amount of turns of transformer. Measurement of power factor. Measurement of mid. valued resistance with wheatstone bridge which is built by resistances. Measurement of middle value resistance by voltmeter-ammeter method.

ELK 113 ELECTRICAL MATERIALS (Theory:3, Lab.:0, Credit:3)

Atomic structures of materials, connection types and their orders, electrical specifications of metals, magnetic specifications of metals, superconductors, semiconductors, insulators, contact materials, thermoelectric materials , ferromagnetic materials.

FEN 101 MATHEMATICS - I (Theory:6, Lab.:0, Credit:6)

I) General Information About Numbers. II) Analytic Geometry: Slope of Line, Line Equations, Distance Formulas, Symmetries. III) Trigonometry: Definitions, Trigonometric Ratios, Sum and Difference formulas, Addition and product formulas, Periods. IV) Complex Numbers : Definitions and properties, Operations, Polar form and De'Moivre's formula. V) Logarithmic and Exponential Functions: Definitions, Properties. VI) Functions: Definitions, Kinds of functions. VII) Limit and Continuity: Definitions, Theorems for limit, Continuity and discontinuity. VIII) Derivative and Differential: Definitions and Properties, Derivative rules. IX) Applications of Derivative: Maximum and minimum problems, Related rates, Taylor and Maclaurin expansions, Indeterminate forms and L'Hopital's rules, Increasing and decreasing functions and extranums, graphs of functions. X) Multivariable Functions: Definitions, Partial Derivatives, Exact differential, Extramums. XI) Linear Algebra: Matrices, Determinants, System of Linear equations and Solution Techniques. XII) Vectors: Definitions and Properties, Dot Product, Cross Product.

FEN 103 PHYSICS - I (Theory:4, Lab.:0, Credit:4)

I) Vectors: Definition, Components, Interactions, Applications. II) Kinematics: ULM, UALM, UDLM, Thraws, UCM, Applications. III) Dynamics: Newton's Law, Friction, Inclined Plane, Applications. IV) Energy: Definitions, Classification, Conservation, Application. V) Momentum: Definition, Linear, Conservation, Collision, Applications. VI) Harmonic Motion : Definition, Equation, Sight, Circular Motion.

KÜL 193 TURKISH LANGUAGE - I (Theory:2, Lab.:0, Credit:2)

KÜL 195 PRINCIPLES OF ATATÜRK AND REVOLUTION HISTORY - I (Theory:2, Lab.:0, Credit:2)

KÜL 197 FOREIGN LANGUAGE - I (ENGLISH) (Theory:2, Lab.:0, Credit:2)

Numbers, letters, verb to be in present tense, Subjective-objective-possessive pronouns, this-that-these-those, adjectives, there is-there are, some propositions (on, in, under), ordinal numbers; Would like, Which?, Whose?, emphatic pronouns, instructions, What make?, can, have got-has got; How much-How many?, What?, one-ones, Which one?, Which ones?, letter format, name, address; What is it like?, present continuous tense; Who?, days of the week, too-either.





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

MAK 175 PROFESSIONAL DRAWING (Theory:2, Lab.:2, Credit:3)

General knowledge about technical drawing, standarts, usage of drawing tools, basic geometrical drawings, pictures of plane pieces and its dimensioning, projection of some parts and their perspective drawing, creating perspectives from projects, cross-sectioning, sketches, dimensioning, tolerance.

FRESHMEN - Second Semester

ELK 112 CIRCUIT ELEMENTS AND MEASUREMENT LABORATORY - II (Theory:3, Lab.:4, Credit:5)

Types of measurement devices, measurement techniques of electric circuit components, electrodynamic and induction coiled devices, Wheatstone bridge, Kelvin bridge, measurement transformers, digital instruments, oscilloscopes and related laboratories.

Laboratory experiments: Detecting of fault spot in lines (Short circuit fault). Measurement of active power. Expanding of ammeters and voltmeters Measurement interval (in DC). Examination of resistance behaviour in AC and DC circuits. Oscilloscope experiment. Correction of fluorescent lamp power factor. Examination of ground leakage fault. Detecting of monophas transformers polarizations.

ELC 172 COMPUTER EDUCATION (Theory:3, Lab.:2, Credit:4)

Introduction to computer. What is the computer systems? Components of computer systems. Computer hardwares. Central Processing Unit (CPU). Microprocessors. Memories; ROM, PROM, EPROM, RAM, CACHE, Hard Disc. Main board, paralelle and sarial ports, input and output components. Computer operating systems. Data communications. Networks. System softwares; operating systems, DOS, WINDOWS, utlity programmes. Single tasking, multitasking. Multimedia.

Laboratory experiments: DOS commands, formatting, create directory, delete directory, file copying, attribute, backup and restore, config.sys. WINDOWS applications. Word and Excel.

FEN 102 MATHEMATICS - II (Theory:6, Lab.:0, Credit:6)

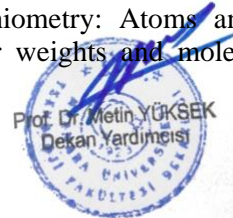
I) Indefinite Integrals: Definition and Properties, Integration Methods. II) Definite Integrals: Definition and Properties, Applications of Definite Integrals. III) Diffrerantial Equations: Definitions, First Order Linear differantial euations, Second order linear differantial equations with constant coefficients, Second order linear differantial equations with variable coefficients.

FEN 104 PHYSICS - II (Theory:4, Lab.:0, Credit:4)

I) Thermodynamics: Heat, Temperature. II) Expansions: Solids, Liquids, Gas, Energy Conservation, Applications. III) Equilibrium: Heat Amount, Heat Interaction. IV) Phase: Definition, Diagram. V) Charge: Definition, Charge and Matter, Point Charge. VI) Coulomb Interaction: Force, Field, Potential, Potential Energy, Applications. VII) Gauss Law: Flux, Conduction, Applications. VIII)Capacity: Definition, Classification, Energy, EMF, Connections, Applications. IX) Resistance: Ohm's Law, Direct Current, Equivalent Circuit, Applications. X) DC Circuit: Kirchoff's Law, Wheatstone Bridge, Applications. XI) Magnetic Field: Definition, Blot-Savart Rule, Ampere's Law, Charge in a MF, Applications. XII) Flux: Definition, Energy, Moment, Applications. XIII) Alternating Current: Definition, Voltage and Current, Impedance, Admittance, Phase and efficiency, Resonance, Applications. XIV)Transformers.

FEN 106 CHEMISTRY (Theory:3, Lab.:0, Credit:3)

I) The Foundations of Chemistry: Matter and energy, States of matter, Chemical and Physical Properties, Chemical and Physical Changes, Mixtures substances compounds and elements, Measurements in Chemistry, Units of measurements. II) Chemical Formulas and Composition Stoichiometry: Atoms and Molecules, Chemical formulas,atomic weights, The mole, Formula weights Molecular weights and moles,





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

Percent composition and formulas of compounds, Derivation of formulas from elemental composition, Determination of molecular formulas, Purity of samples. III) Chemical Equations and Reaction Stoichiometry: Chemical equations, Percent yields from chemical reactions, sequantal reactions, Concentration of solutions, Dilution of solutions, Using solutions in chemical reactions. IV) The Structure of Atoms: Fundamental particles, The discovery of electrons, Canal rays and protons, Neutrons, Mass numbers and isotops, The periodic table and electron configurations. V) Gases: Comparison of solids, liquids and gases, some common properties of gases, Boyle's Law, Charles Law, Standart temprature and pressure, The combined gas law equation, Avagadro's Law and standart molar volume, The ideal gas equation, Dalton's Law of partial pressure, Graham's Law, Real gases and deviations from ideality. VI) Liquits and Solids: Viscosity, Surface tension, Evoparation, Vapor pressure, Heat transfer involvint solids, Sublimation and vapor pressure of solids, Phase diagrams. VII) Solutions: The dissolution process, Molarity and mole fraction, Colligative properties of solutions, Membrane osmotic pressure, Lowering of vapor pressure and Rault's Law, Boiling point elevation and freezing point depression. VIII) Chemical Equilibrium : Basic concepts, The equilibrium constant, The reaction quotient, Application of stress to a system at equilibrium, Partial pressure and equilibrium constant, Heterogeneous equilibra. IX) Chemical Thermodynamics: Thermodynamics laws, Some thermodynamics terms, Changes in internalenergy, Hess Law, Entropy, Free energy change.

KÜL 194 TURKISH LANGUAGE - II (Theory:2, Lab.:0, Credit:2)

KÜL 196 PRINCIPLES OF ATATÜRK AND REVOLUTION HISTORY - II (Theory:2, Lab.:0, Credit:2)

KÜL 199 FOREIGN LANGUAGE - II (ENGLISH) (Theory:2, Lab.:0, Credit:2)

Time, be going to, simple present tense and frequency adverbs, s of manner, verb to be in past tense, When?, montlas, What was it like?, thers was-there were, simple past tense, a little-a few, past continuous tense must-mustn't-needn't, too-enough, present perfect tense, present perfect continuous tense, past perfect tense, past perfect continuous tense, prepositions (out side, into, out of, up, from, between, in front of, behind, across, along, near, round). Why?... Because.

EĞT 182 PRINCIPLES OF VOCATIONAL TECHNICAL EDUCATION (Theory:2, Lab.:0, Credit:2)

1.) Define technical and vocational education. 2.) Describe the historical context of technical and vocational education. 3.) Describe the foundations and organisation of technical and vocational education. 4.) Understand the legal basic of technical and vocational education. 5.) Describe the current provision and characteristics of technical and vocational education. 6.) Understand some of the problems and trends in technical and vocational education.

SOPHOMORE - First Semester

ELK 211 ELECTRIC CIRCUITS AND LABORATORY - I (Theory:4, Lab.:2, Credit:5)

Basic laws, resistance and Ohm's Law, simple desistance circuits, series dc circuits, parallel dc circuits, series-parallel dc circuits, ideal and non-ideal sources, source converted circuits, looped circuits, mesh analysis and nodal analysis for looped dc circuits, circuit analysis techniques, superposition theorem, Thevenin, Norton and maximum power transfer theorems, capacitor, transients in RC circuits, charge and discharge phases in a capacitor, energy storage in a capacitor, inductor, transients in RL circuits, energy storage in a coil, discharge phase in a coil.

Laboratory experiments: Investigating the parameters affecting the conductor resistance. Series circuits in DC. Parallel circuits in DC. Series-parallel circuits in DC. Mesh analysis in DC circuits. Nodal analysis in DC circuits. Thevenin theorem in DC.





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

ELK 217 ELECTRIC MACHINES - I (Theory:4, Lab.:3, Credit:6)

Induction concept in DC Machines. The magnitude and direction of the induced voltage. The voltage induced in a rotating conductor. Unidirectional current from alternating current. Construction of DC machines, the armature the field poles, collector and brushes bearing, bearing and governor. Armature reaction and the effects of it. Compensation of armature reaction. Commutation and undergoing commutation. Methods of excitation. Open-circuit and load characteristics of shunt, series, compound and separately-excited generators. Series and parallel operation of DC generators. The fundamental principles of Dc motors. Counter Emf in DC motors. Speed, torque and mechanical power. Standing DC motors. Determining the resistance steps and grading of standing resistance for shunt motor. Methods of speed control. Losses and efficiency in DC machines. Faults and repairing of DC machines.

Laboratory experiments: No load and load characteristic of a separately excited, (self-excited)shunt and a compound dc generator(over compounded, flat compounded, under compounded and differentially compounded with short-shunt connection and long shunt connection). Load characteristic of a series generator. Connecting series and shunt generator in series. Series and shunt and over compound in parallel and division of load. Measurement of excitation armature current characteristic of shunt motor and shunt generator. Torque load characteristic of shunt, compound and series motor. Speed load characteristic of shunt, compound and series motor.

ELK 219 WINDING TECHNOLOGY (Theory:2, Lab.:2, Credit:3)

Kinds of DC machines, kind of armature and excitation coil winding, calculating, drawing and applications, kinds of armature and excitation coil breakdown, determine and repair. Wire radius of armature and excitation and calculating of winding number. Kinds of transformers winding, structures, winding calculation and samples. Transformers breakdown, determine and repair. Kind of three phase induction machines winding, structures, breakdown determine and repair.

Laboratory experiments: DC armature and excitation coil winding, three phase induction machines winding, transformers winding.

ELK 221 ELECTROMAGNETIC FIELDS - I (Theory:3, Lab.:0, Credit:3)

Introduction to electromagnetic fields, scalars and vectors, the cartesian , cylindrical and spherical coordinate systems, transformations between coordinate systems, Coulomb's law, electric flux density, Gauss's law, Maxwell's first equations, energy expended in moving a point charge in an electric field, energy density in the electrostatic field , Poisson's and Laplace's equations

ELK 225 PROFESSIONAL MATHEMATICS (Theory:4, Lab.:0, Credit:4)

I) Series and Power Series: Definitions, Convergency and divergency theorems, Power series and radius of convergency. II) Fourier Series and Integrals: fourier series, Odd and even functions, Half range fourier sine and Fourier cosine series, Complex form of Fourier series, Parseval's identity for Fourier series, Finite fourier series, The fourier integrals, complex form of fourier integrals, Fourier transforms, Fourier sine and fouriercosine transforms, The convolution theorem, Parseval's identitiy for Fourier transforms. III)Laplace Transforms: Definitions, Laplace transforms of some elementary functions, Some important properties of Laplace taransforms, Laplace transforms of derivatives, Laplace transforms of integrals, Periodic Functions, Initial and Final value theorems, Methods of finding Laplace transforms, Some special Functions. IV) The Inverse Laolace Transforms: Definitions, Properties, Inverse Laplace Transforms of derivatives, Inverse Laplace transforms of integrals, Methods of finding inverse Laplace Transforms. V) Applications to Differantial Equations: Ordinary differantial equations with constant and variable coefficients, Simultaneous ordinary differantial equations, application of electrical circuits. VI) Applications to Integral and Diferance Equations. VII) Transforms: Definitions, Z Transforms, Inverse Z Transforms





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

ELC 279 COMPUTER PROGRAMMING (Theory:3, Lab.:2, Credit:4)

Scanning of high level programming language. Introduction to BASIC, characters, variables, arithmetical operation, control commands, counters, mathematical functions, loops, screen organizer commands, flow chart, interrupt, files.

Laboratory experiments: BASIC commands, REM, PRINT, CLS and their examples. Counter and FOR-NEXT. IF-THEN-ELSE, AND-OR, TAB, LOCATE. GOSUB-RETURN

EĞT 281 INDIVIDUAL AND LEARNING PROCESS (Theory:2, Lab.:0, Credit:2)

1.) Identify the differences between individual students in relation to a number of psychological factors. 2.) Use a variety of measures to identify quantitatively the differences between students. 3.) Understand the differences between adolescents and adults and the transition from one to the other. 4.) Be aware of the different developmental stages as they occur within the individual. 5.) Describe some of the basic principles that relate to human learning processes. 6.) Plan and prepare lessons that take into account an understanding of human learning processes.

EĞT 283 LEARNER AND GROUP PROCESS (Theory:2, Lab.:0, Credit:2)

1.) Describe the relationship between education and the process of socialisation. 2.) Account for social mobility. 3.) Describe the role of the school as a social institution. 4.) Be aware of the effects of group dynamics in the school. 5.) Understand the role of the teacher.

SOPHOMORE - Second Semester

ELK 212 ELECTRIC CIRCUITS AND LABORATORY - II (Theory:4, Lab.:2, Credit:5)

Sinusoidal alternative waveforms, alternative current and voltage, phase, phase relations, average and RMS values, general and polar forms, series ac circuits, parallel ac circuits, series-parallel ac circuits, voltage and current division rules, dependent voltage and current sources, mesh analysis and nodal analysis for looped ac circuits, star-delta and delta-star conversions, superposition theorem, Thevenin, Norton and maximum power transfer theorems, power in ac, apparent and reactive power, power compensation, series and parallel resonance circuits, mutual inductance.

Laboratory experiments: Series circuits in AC. Parallel circuits in AC. Series-parallel circuits in AC. Mesh analysis in AC circuits. Nodal analysis in AC circuits. Thevenin theorem in AC. Resonance circuits.

ELK 214 ILLUMINATION TECHNIQUE AND PROJECT (Theory:3, Lab.:2, Credit:4)

Aims of illumination, lighting theorems, lighting units, types of bulbs, examining illumination networks, lighting economy, lighting distribution diagrams, calculations and project drafting. Introduction to installation technique, electrical installation staff, division and branch of installation, setting lighting devices and power calculation, determination of voltage drop

ELK 216 INSTALLATION TECHNIQUE (Theory:2, Lab.:2, Credit:3)

Introduction to installation technique, electrical installation staff, division and branch of installation, setting lighting devices and power calculation, voltage drop determination.

ELK 218 ELECTRIC MACHINES - II (Theory:4, Lab.:3, Credit:6)

Structure of Induction Machines. Type of the rotor Construction of an Induction Motor. Determination of Equivalent-Circuit Parameters. Generated Voltage, No-Load, Full-Load, Short Circuit Operation, Slip, Current and Voltage in the Rotor Circuit of an Induction Motor. Performance Criteria of Induction Motors, Phasor diagrams, Induction Generator, Energy Flow Diagrams, Mechanism of Torque Production, Speed Control Methods of Induction Motors, Circle diagram, Determination of the Losses and Efficiency, Operation of a three Phase Induction Motor as a mono phase Induction Motor.





T.C. MARMARA UNIVERSITY
TECHNICAL EDUCATION FACULTY
ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

Laboratory experiments: Determination of Slip an Induction Motor. No-Load Operation of Three Phase Induction Motor. Short Circuit Operation of Three Phase Induction Motor. Circuit Diagram Drawing of an Induction Motor. Full-Load Operation of Three Phase Induction Motor. Generator Mode Operation of Three Phase Induction Motor. Synchronised Induction Motor experiment. Mono phase Induction Motors and Operation a three Phase Induction Motor as a mono phase Induction Motor.

ELK 222 ELECTROMAGNETIC FIELDS - II (Theory:3, Lab.:0, Credit:3)

Biot-Savart law, Amper law, magnetic flux and flux density, electromagnetic force and their effects, limit conditions, Faraday's and Lenz's laws, general wave equations.

ELK 224 MEASUREMENT TECHNIQUE (Theory:2, Lab.:2, Credit:3)

Physical measurements, sensitivity components, temperature, measuring systems, electrical temperature evaluators based upon expanding basic with heat effect, measuring of electrical temperature by thermo-components, measuring of sensitive temperature by pyrometers, speed measuring methods, electrical level control, liquid level measuring systems, weight measuring systems.

Laboratory experiments: Temperature measuring, speed measuring, measuring by transducers, measuring by opto-couplers, electrical level control experiments.

EĞT 282 JOB ANALYSIS AND PROGRAMME DEVELOPMENT (Theory:2, Lab.:0, Credit:2)

1.) Describe the principles of programme development. 2.) Describe the main types of programmes. 3.) Describe the role and purpose of learning outcomes in education. 4.) Carry out job, task and skill analyses. 5.) Prepare the content of a programme. 6.) Select and arrange an appropriate teaching/learning situation. 7.) Evaluate a programme.

EĞT 284 TEACHING METHODS AND TECHNIQUE (Theory:2, Lab.:0, Credit:2)

1.) Describe and apply range of teaching methods and techniques. 2.) Prepare students for learning. 3.) Plan teaching and learning activities. 4.) Apply research – analysis and assignments.

JUNIOR - First Semester

ELK 321 INTRODUCTION TO CIRCUITS ANALYSIS (Theory:3, Lab.:0, Credit:3)

Basic concepts of circuit analysis, theorems, basic units related circuit analysis, functions, equivalence in sources, R,L,C series and shunt equivalents, circuit analysis methods.

ELK 323 MEDIUM VOLTAGE NETWORKS (Theory:3, Lab.:0, Credit:3)

The structure of devices used in medium voltage networks, performily description of characteristic and the principles of determination economic subjects in performing, to subcomponents of networks, calculation methods, related to selection of subcomponents.

ELK 335 ELECTRIC MACHINES - III (Theory:4, Lab.:3, Credit:6)

Ampere's and Faraday's Laws. Importance of Transformer Concept and Application area. Basic Structure of a Transformer, Operation principle, Magnetic circuits and variaties, Induced voltage and basic voltage equation, turns ratio, No-load Current and Compenenets, Losses and Power Factor, Appearent and Reactive Powers, Short Circuit Operation and Application, No Load, Full Load and Short Circuit Operation Diagrams, "T" Equivalent Circuits and Diagrams, Simplified Equivalent Circuits and Diagrams. Defining Equivalent Circuit Parameters, Voltage Variations Under Load. Examining Voltage Variations by Analitical Methods, Efficiency of the Transformer, Function of the Efficiency with Power Factor and Load Variation, Maximum Efficiency, Auto Transformer Equivalent Circuits and Phasor Diagrams, Determination of the





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

Polarity, Zero-Phase-Sequence Connections. Parallel Connections of the Transformers, Instrument Transformers, Current and Voltage Transformers.

Laboratory experiments: Measurement of the Transformer Coil Resistance. Determination of the Turns Ratio on the Transformer. No-Load Operation of Transformers. Short Circuit Operation of Transformers. Circuit Diagram Drawing of an Induction Motor. Determination of the Polarity on the Transformers. Full-Load Operation of Transformers. Regulation and Efficiency on the Transformers. Measurement of the Phase Angle Between Primary and Secondary Circuit with Oscilloscope. Parallel Connections of the Mono-phase Transformers.

ELC 371 ELECTRONICS (Theory:4, Lab.:2, Credit:5)

Introduction to electronics, transmission in conductor and semiconductor, current carriers, transistors and diodes and their equations, rectifiers, FETs, MOSFETs and their characteristics, amplifiers.

ELC 375 CONTROL TECHNIQUES - I (Theory:4, Lab.:4, Credit:6)

Control symbols and their applications, introduction to control components (relay, switch), examining starting methods of A.C and D.C motors by using control components, starting methods with star/delta switch and the other methods, introduction to pneumatic, pneumatic circuit components and symbols, valves and related laboratories.

EĞT 381 MEASUREMENT AND EVALUATION IN EDUCATION (Theory:2, Lab.:0, Credit:2)

1.) Discuss the role and importance of measurement and evaluation in the educational process. 2.) Describe the fundamental concepts involved in measurement and evaluation. 3.) Describe the characteristics of measuring instruments. 4.) Describe measuring instruments appropriate to cognitive, psychomotor and affective behaviours. 5.) Describe the use and application of standardisation techniques. 6.) Apply evaluation techniques to their teaching

EĞT 383 TECHNOLOGY OF EDUCATION (Theory:2, Lab.:0, Credit:2)

1.) Describe the history and development of technology of education. 2.) Describe the relationship between communication and learning. 3.) Describe a range of traditional teaching/learning resources, with their typical uses, advantages. 4.) Describe modern developments in technology of education. 5.) Justify the use of any particular teaching/learning resources. 6.) Apply a range of teaching/learning resources to maximise student involvement and learning. 7.) Develop teaching/learning resources as and when required.

JUNIOR - Second Semester

ELK 324 PROTECTION IN POWER SYSTEMS (Theory:2, Lab.:0, Credit:2)

An explanation to the effects of electricity, safety rules, faults, fault statistics, isolation, and safety systems and components. Protection relays (Over Current, Buchholz, Thermal, Differential etc.) and their applications.

ELK 326 DISCHARGE IN HIGH VOLTAGE (Theory:2, Lab.:0, Credit:2)

Basic and experimental methods in examining, gas discharge events related to electrons and ions in vacuum, electron excitation of gas atom and other discharge events.

ELK 336 ELECTRIC MACHINES - IV (Theory:3, Lab.:3, Credit:5)

Classification of synchronous machines. Construction of alternators, armature and poles. Distribution, pitch and form factor. Generated emf in alternators. Armature effective resistance, leakage reactance. Armature reaction. Equivalent circuits of synchronous machines. Alternator regulation. Calculation of voltage regulation according to synchronous-impedance method and Potier delta. Parallel operation of alternators.



T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

Dividing active load and reactive load of parallel alternators. Principle of operation and methods of starting a synchronous motor. V curves of the synchronous motor. Power and torque relationships. Maximum torque and torque angle. Electromagnetic vibration of synchronous machines. Single-phase synchronous motors.

Laboratory experiments: Calculation and determination of alternator voltage regulation according to synchronous impedance method (open – circuit test and short – circuit test of an alternator). Calculation and determination of alternator voltage regulation according to potier delta method (open – circuit test and loaded saturation test of an alternator). Load characteristic of an alternator according to ohmic, inductive and capacitive load. Measurement of the terminal voltage versus armature current for different load power factors. Measurement of the excitation current versus armature current for different load power factors. Loaded saturation characteristics of an alternator according to different load power factors. Parallel operation of alternators and dividing the active and reactive load of parallel alternators. Methods of starting a synchronous motor. V curves of the synchronous motor. Power factor correction (improvement) with synchronous motor.

EELK 342 POWER ELECTRONICS (Theory:4, Lab.:2, Credit:5)

Power semiconductor diodes. Diode circuits and rectifiers. Thyristors. Controlled rectifiers. AC voltage controllers. Thyristor commutation techniques. Power transistors. DC choppers. Pulse Width Modulated Inverters. Resonant Pulse Converters. Static switches. Power supplies. Protection of devices and circuits.

Laboratory experiments: Thyristor characteristics and Thyristor in the DC circuit. Characteristics and switching performance of a triac. DC chopper converter with Thyristor commutation circuit. GTO thyristor with control circuit. Pulse generators and Trigger Circuits for Thyristor Gate triggering. Phase angle control with diac and triac. Triac snubber circuit. Zero voltage switch. 1 Phase controlled half wave rectifier. 1 Phase Half-controlled Full wave rectifier. 1 Phase controlled Full wave rectifier. Phase control with anti parallel connection of thyristors.

ELC 378 LOGIC CIRCUITS (Theory:3, Lab.:2, Credit:4)

Introduction to logic circuits, BCD code systems, AS2 code, Boolean Algebra, definition of logic gates, AND, OR, NAND, NOR, EXOR, EXNOR truth table, Karnaugh maps, counters, flip-flops and timers, related experiments.

ELC 376 CONTROL TECHNIQUES - II (Theory:4, Lab.:4, Credit:6)

Control of multi-speed A.C motors starting to slip-ring A.C motors, breaking systems, calculations belong to breaking and starting methods, single phase A.C motors and their control methods, elevators, introduction to electropneumatics, diagrams and electropneumatics components.

EĞT 382 MICRO TEACHING (Theory:2, Lab.:0, Credit:2)

1.) Understand the reasons for practicing the skill elements of teaching via micro teaching. 2.) Prepare implementation plans for micro teaching and practice lesson sessions. 3.) Practice and develop competence in the basic skill aspects of teaching. 4.) Practice combining these basic elements together during a longer lesson. 5.) Gain confidence in teaching to a group of learners. 6.) Develop skills of communication. 7.) Be aware of need to vary activities in a lesson. 8.) Become aware of feedback from student behaviour about effectiveness of teaching and evaluate their own performance via play back of video in both micro teaching and practice lesson sessions. 9.) Be able to replan future lessons in the light of feedback from micro teaching sessions.

EĞT 384 OCCUPATIONAL TESTS (Theory:2, Lab.:0, Credit:2)

1.) Gather student data using formal data collection techniques. 2.) Gather student data through personal contacts. 3.) Use conferences to help meet student needs. 4.) Provide information on educational and career opportunities. 5.) Assist students to apply for employment or further education.

SENIOR - First Semester





T.C. MARMARA UNIVERSITY

TECHNICAL EDUCATION FACULTY

ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)

ELK 411 POWER SYSTEMS - I (Theory:3, Lab.:3, Credit:5)

Introduction to energy systems, loss problems of energy technique, process instruments, structure of plants, plant types, safety systems.

ELK 413 POWER TRANSMISSION AND DISTRIBUTION - I (Theory:3, Lab.:0, Credit:3)

Description of power systems , topological classification of power systems, D.C and A.C transmission comparison , principles of AC power transmission, per-unit calculation, line parameters and their equivalents, types of power transmission lines, characteristic impedance and natural power.

ELK 465 MECHANICAL CALCULATION IN POWER TRANSMISSION LINES (Theory:3, Lab.:0, Credit:3)

Conductors and their structure, strength calculation, forces, thermal limits, extra ice and wind loads and related calculations, detailed information about poles and pole types.

ELK 429 HIGH VOLTAGE TECHNIQUES (Theory:3, Lab.:0, Credit:3)

The examining of the electron systems from point of view of being punctured, Schwarz transformation, graphics and experimental methods, dielectric losses, high voltage overhead transformation line cables, grounding systems.

ELK 463 SCIENTIFIC RESEARCH TECHNIQUES (Theory:2, Lab.:0, Credit:2)

Principles of scientific research, research education, research process and techniques, data addition techniques and methods, data processing, using computer in data processing.

ELK 473 AUTOMATIC CONTROL - I (Theory:3, Lab.:0, Credit:3)

Mathematical models of physical systems, the response of system components to steady state and transient conditions, stability of control systems, Routh and Nyquist stability criterion, optimization in control systems.

ELK 477 PROGRAMMABLE CONTROLLERS (Theory:2, Lab.:2, Credit:3)

Programmable Logic Controllers (PLC) system configuration, PLC I/O specifications, ladder diagram programming, mnemonic programming, PC-PLC link interface, advanced computing instruction, external display and present function, ADC and DAC applications, monitoring operations.

Laboratory experiments: Explanation of using simulation programmes of IDEC PLC. Ladder diagram programming. Statement List Programming. LDR and STL programming by using basic instructions. External display and External preset functions. Computing Functions.

EĞT 481 MANAGEMENT OF TEACHING (Theory:2, Lab.:0, Credit:2)

1.) Demonstrate knowledge of the concepts and procedures involved in determining the required teaching/learning resources. 2.) Demonstrate knowledge of the concepts and factors involved in evaluation the effectiveness of teaching/learning resources. 3.) Demonstrate knowledge of the factors involved in and procedures for improving teaching/learning resources. 4.) Demonstrate a knowledge of techniques and procedures for organising various type of filing systems. 5.) Demonstrate a knowledge of the techniques and procedures for the safety of the students when using teaching/learning resources. 6.) Demonstrate a knowledge of the national legal requirements for occupational health and safety. 7.) Demonstrate the steps involved in organising for student first aid needs. 8.) Plan a procedure for providing for the first aid needs of students. 9.) Demonstrate knowledge of the concepts of and important considerations involved in classroom, laboratory, workshop discipline. 10.) Demonstrate knowledge of the principles and procedures involved in managing



**T.C. MARMARA UNIVERSITY
TECHNICAL EDUCATION FACULTY
ELECTRICAL EDUCATION DEPARTMENT (Nokta otomasyon sistemi)**

vocational technical workshops or laboratories. 11.) Plan a tool an equipment inventory control system for a practical activities area in your specialism.

SENIOR - Second Semester

ELK 412 POWER SYSTEMS - II (Theory:3, Lab.:3, Credit:5)

Setting networks, necessary equipments, determining network load, the principles of network calculation, network problem solution methods, network calculations, connection scheme of transformer station.

ELK 414 POWER TRANSMISSION AND DISTRIBUTION - II (Theory:3, Lab.:0, Credit:3)

Stability and transient analysis of the power systems, fault types and calculation of power system faults, max. power in short circuit, symmetrical three-phase faults on synchronous machines , unsymmetrical faults on power systems, faults through impedance.

ELK 416 COMPUTER AIDED DESIGN OF ELECTRICAL SYSTEMS (Theory:2, Lab.:2, Credit:3)

Information about Autocad, screen organize, drawing assistant commands, drawing arrangement commands, output commands, drawing electrical symbols, drawing electric installation.

ELK 430 HIGH VOLTAGE MEASUREMENT TECHNIQUES (Theory:3, Lab.:0, Credit:3)

High voltage and current measurement, measurement of pulse voltage, oscilloscope usage, and measurement methods for high voltages and currents.

ELK 460 GRADUATE PROJECT (Theory:0, Lab.:2, Credit:1)

Project is a course that is taken by each student as an individual or small group on different subjects under the instructor. The aim of this course is to give problem solving ability to the student and to be used their knowledges learned during the education period.

ELC 472 MICROPROCESSORS (Theory:3, Lab.:0, Credit:3)

As an extension of logic circuit course RAM and ROM conceptions, memory organization, arithmetic circuits, 6803 micro computer system, OP CODE conceptions, RS-232, CENTRONIC sub units, screen driver unit and screen types.

ELC 474 AUTOMATIC CONTROL - II (Theory:2, Lab.:2, Credit:3)

Mathematical models of physical systems, the response of system components to steady state and transient conditions, stability of control systems, Routh and Nyquist stability criterion, optimization in control systems.

EĞT 482 TEACHING PRACTICE AND EVALUATION (Theory:2, Lab.:4, Credit:4)

1.) Prepare time based implementation plans. 2.) Effectively observe lessons conducted in classrooms. 3.) Produce materials in preparation for teaching. 4.) Carry out teaching activities. 5.) Carry out educational and training activities. 6.) Carry out necessary administrative duties. 7.) Prapare implementation files.

