

COURSE DESCRIPTION

Course Title: Electrical Machinery – Part 1	Code: BpEE30	Semester: 5
Type of Teaching: Lectures, Seminars and Laboratory work, Course work	Hours per week: L – 3 hours, S – 2 h , LW – 2 h, CW - 1 h, Self Study – 7 h.	Credits: 8

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Vasil Drambalov, Ph.D., e-mail: drambalov@abv.bg, Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Bachelor of Science.

COURSE OBJECTIVES: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – transformers, induction motors, special induction motors and induction micromotors. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

COURSE DESCRIPTION: Basic topics: Transformers – design and principle of operation. Voltage equations, equivalent diagrams and vector diagrams of single-phase two-winding transformer. Transformer operation at no-load, short circuit and loading. Calculation of the transformer magnetic circuit. Schemes and groups of connection of transformers. Parallel operation. Voltage control in transformers. Autotransformers – equations, equivalent diagrams and vector diagrams. Three-winding transformers - equations and equivalent diagrams. No-load, short-circuit and loading modes of three-winding transformers. Asymmetrical modes and transients in transformers. Theory of a.c. machines. Windings of a.c. machines. Electromotive force in a.c. windings. Magnetomotive force in a.c. windings. Induction machine at locked rotor. Referring the rotor winding to stator winding. Voltage equations and equivalent diagrams of induction machines. Operation of induction machine as motor, generator and counterswitching mode – power relationships and vector diagrams. Rotating torques, circular diagram and characteristics of induction machine. Starting of three-phase induction motors and speed control. Squirrel cage induction motors with current displacement in rotor winding. Operation of induction motors under non-rated conditions. Special induction machines. Single-phase and capacitor induction motors. Induction micromachines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements.

TEACHING METHOD: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHODS OF EXAMINATION AND ASSESSMENT: Laboratory exercises (20 %), course work with two tasks (20 %) and written exam at the end of the 5th semester (60 %).

TEACHING LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, част първа, София, Техника, 1988; 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – първа част, Пловдив, Академично издателство на Аграрния университет, 2002. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

COURSE DESCRIPTION

Name of the course: Electrical apparatus I	Code: BpEE31	Semester: 5
Type of teaching: Lectures, seminar exercises, laboratory work, course work and self-study	Lessons per week: L – 3 hours, SE – 1 hour, LW – 2 hours, Self-study – 6 hours.	Number of credits: 7

LECTURER: Principal Assistant Ivan Hadzhiev, Ph.D., Technical University of Sofia, Plovdiv Branch, Faculty of Electronics and Automation, Department of Electrical Engineering, Phone: (032) 659686, e-mail: hadzhiev_tu@abv.bg.

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in “Electrical Engineering” at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, for receiving the Bachelor of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will be acquainted with the underlying essence of the heat, electrodynamic and electromagnetic processes and phenomena, as well as with the application of the studied dependencies for calculation of the components of electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Electrodynamics phenomena in electrical apparatus – methods for calculating the electrodynamic forces and moments at direct, alternating and short circuit currents; Heating and cooling in electrical apparatus – heat transfer, stable and transient processes at heating and cooling, at short circuit, thermal stability of the apparatus; Electromagnetic systems – magnetic circuits for direct and alternating current, electromagnets and magnetic circuits with permanent magnets, dynamics and time of triggering the electromagnets, calculation of their coils; Static electromagnetic devices – inductors, reactors etc.; Electromagnetic actuators, electromagnetic sensors and special transformers.

PREREQUISITES: Knowledge of Physics, Mathematics, Mechanics, Theoretical Electrical Engineering, Electrical materials, Electrical Measurements.

TEACHING METHODS: Lectures, prepared for multimedia presentation, seminars and laboratory exercises, during which problems are solved and experiments, related to the topics of the lectures are conducted.

METHOD OF ASSESSMENT: Laboratory work (15%), seminar exercises (20%), written examination (65%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Alexandrov A., Electrical apparatus - part I, Electromagnetic and thermal problems, Heron Press, Sofia, 2002, 337, ISBN 954-580-117-4 (Bulgarian).
2. Maslarov I., S. Shishkova-Panaiotova, Laboratory experiments on electrical machines and apparatus. Plovdiv, 2000 (Bulgarian).
3. Alexandrov A., H. Gergova, V. Piperov, Guide seminars on electrical apparatus, Sofia, 2000 (Bulgarian).
4. Malamov D., Design of drive electromagnets: Part One: Electromagnets for constant voltage Part Two: Electromagnets the AC power frequency, Plovdiv, MACROS, 2013 (Bulgarian).
5. Pisarev A., A. Lichev, Design of switchgear for low voltage, Sofia, Technics 1987 (Bulgarian).

DESCRIPTION OF THE COURSE

Name of the course: High Voltage Engineering	Code: BpEE32	Semester: 5
Type of teaching: Lectures; Laboratory work.	Lessons per week: L - 2 hours; LW - 2 hours.	Number of credits: 5

LECTURERS: Assoc. Prof. PhD. Stanimir Stefanov (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv;
As. PhD. Ilko Turpov, (FEA), 032659583, e-mail: stsb_plovdiv@abv.bg, Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for the major Electrical Engineering of the Faculty of Electrical Engineering and Automation, Bachelor of science.

AIMS AND OBJECTIVES OF THE COURSE:: The subject aims at introducing students to new theoretical knowledge and practical skills in different fields: isolation characteristics of electric high voltage systems; over-voltages in electric networks and devices, over-voltage protection, selection of isolation levels in the high voltage systems.

DESCRIPTION OF THE COURSE: Insulation characterizations of electric power equipment and grid –electrical break in air, variety test voltage of equipment, insulation characterizations of insulation, effect crown, skin discharges; Stability over-voltage – by earth connections, resonance over-voltages, resonance increase of the voltage by end of distribution line, over-voltage by drop out of the load; Commutation over-voltages – by turn off reactive loads, by earth's connections through cutting off arc, by turn off short circuit, by turn on long distribution lines; Lightning's over-voltages – electromagnetic processes, characterizations of lightning activity, specific number of turn off by lightnings, valve down-leads, lightning's over-voltage in electrical outfits, over-voltage in coil of transformer; Coordination of isolation – determinist and static coordination, chose of isolation levels.

PREREQUISITES: The course of lectures is based on knowledge of FpBEE02, FpBEE09, FpBEE10, FpBEE18 and BpEE24.

TEACHING METHODS: Lectures. Labs are conducted in accordance whit the lab books and reports prepared by the students and checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of the semester (70%), laboratories (20%) and participation in lectures (10%).

INSTRUKTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Тодорова. А., Записки лекции по Техника на високите напрежения, ТУ – София.
2. Генов Л., Техника на високите напрежения в електроенергийните системи, ДИ "Техника", София, 1992.
3. Нанчев Н., М. Георгиев, Техника на високите напрежения, ДИ "Техника", София, 1997.
4. Вълчев М., М. Георгиев, А. Тодорова, Г. Дюстабанов, П. Тошев, Ръководство за лабораторни упражнения по техника на високите напрежения, ДИ "Техника", София, 1976.
5. Иванов Кр., П. Петров, Техника на високите напрежения. Ръководство за лабораторни упражнения. "Принт", Габрово, Ръководство за лабораторни упражнения, 2000.

COURSE DESCRIPTION

Name of the course Telecommunication Techniques	Code: BpEE33	Semester: 5
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 1 hour, Self Study – 3 hours	Number of credits: 3

LECTURER: Assis. prof., PhD, Stoian Avramov (FME), Department of Transport and Aircraft Equipment and Technologies (TAETD), [tel:032/ 659 708](tel:032/659708) Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the bachelor students specialty “ELECTRICAL ENGINEERING”.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course students must know the main principles and methods of building, maintaining and using of modern telecommunication systems.

DESCRIPTION OF THE COURSE: Main topics concern: Introduction to communication networks and communications systems protocol models with emphasis on the basic OSI 7-layer Model, media infrastructure and hardware interfaces. Communications systems architectures, including PSTN – POTS, ISDN; TV and radio broadcast, CATV, WANs, MANs, LANs – Ethernet, Token ring, Internet and information highway technologies; cellular networks - GSM, satellite, mobile and wireless technologies etc. Foundations of transmission media, signalling, coding, error detection and correction, addressing, routing, data compression, and access protocols.

PREREQUISITES: Basic courses for the “ELECTRICAL ENGINEERING” specialty.

TEACHING METHODS: Lectures, using slides and multimedia, laboratory exercises, telecommunication sites and companies visits.

METHOD OF ASSESSMENT: Test (100%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Roger L. Freeman, Telecommunication System Engineering, ISBN: 978-0-471-72620-3, Wiley, 2015
2. J. Dunlop; D. Smith, Telecommunications Engineering, ISBN: 978-1-461-58006-5, Springer, 2014
3. Христов Хр., Мирчев С., Недялчев Н. Основи на телекомуникациите. С., Нови знания, 2004
4. Мерджанов П. Телекомуникационни мрежи, ч. I, С., Нови знания, 2002
5. Столингс В. Компьютерные системы передачи данных. М., "Вильямс", 2002.

COURSE DESCRIPTION

Name of the course: Lighting and Installation Technology	Code: BpEE34	Semester: 5
Type of teaching: Lectures; Laboratory work.	Lessons per week: L - 2 hours; LW – 1 hour.	Number of credits 4

LECTURER: Assoc. Prof. PhD. Stanimir Stefanov (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Eligible subject for the major Electrical Engineering of the Faculty of Electrical Engineering and Automation, Bachelor of Science.

AIMS AND OBJECTIVES OF THE COURSE: The objectives of the course “Lighting and Installation Technology” are extending students’ knowledge in the field of photometry and colorimetry, the component base of lighting and installation technique, the physiological optics, design and exploration of lighting systems, lighting and signaling electrical installations.

DESCRIPTION OF THE COURSE: The subject of the course is directly connected with the profile of the major and covers theoretical bases in lighting technology; structure, parameters and applications of light sources and luminaries; requirements, calculations and methods for design of interior and exterior lighting systems, specific requirements, methods for sizing and design of lighting and signaling electrical installations.

PREREQUISITES: The course is conducted on the basis of knowledge from the courses: FpBEE02, FpBEE09, FpBEE10, FpBEE18 and BpEE24.

TEACHING METHODS: Lectures. Labs are conducted in accordance with the lab books and reports prepared by the students and checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of the semester (70%), laboratories (20%) and participation in lectures (10%).

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Пачаманов А. Електроснабдяване и осветителна техника. Част 1. Основи на осветителната техника; Част 2. Проектиране на осветителни уредби и електрически инсталации, ТУ - София 2002, 2004.
2. Иванов З. Осветителна и инсталационна техника, София, Авангард Прима, 2010.
3. Пачаманов А. Електроснабдяване и осветителна техника. Част 3. Ръководство-работна тетрадка за курсов проект по осветителна и инсталационна техника, Авангард Прима, София 2004.
4. Пачаманов А., Нели Рац. Ръководство за лабораторни упражнения по осветителна и инсталационна техника. Авангард Прима, София, 2005.
5. Василев Н., Промислено осветление, София, Техника, 1973.
6. Диканаров Г. Ръководство за лабораторни упражнения по осветителна и инсталационна техника, София, АВС Техника, 2002.
7. Пачаманов А., Б. Прегъзов, Д. Бибев. Специални осветителни уредби - ръководство за лабораторни упражнения и самостоятелна подготовка, София, Авангард, 2003.
8. Андрейчин Р. и др. Наръчник по осветителна техника - том I и том II. София, Техника, 1977.
9. БДС EN 12464.
10. БДС EN 13201.
11. НАРЕДБА №3 от 9.06.2004 г. за устройство на електрическите уредби и електропроводните линии..

CHARACTERISTICS OF THE COURSE

Name of the course: Power engineering	Course Code: BpEE35	Semester: 5
Type of the course: Lectures	Lectures: 2 hours	ECTS Credits: 5

Lecturer: Chief Asst. Dr. Ilko Tarpov, Chair of Electrical Engineering, Tel.: 032659583, e-mail: stsb_plovdiv@abv.bg, Technical University of Sofia, Branch Plovdiv

Disciplinary Status of the Course: Mandatory discipline for the students enrolled in Electrical Engineering of the Chair of Electrical Engineering and Automation, Bachelor's Degree.

Goal of the Course: The goal of the course is for the students to acquire basic theoretical knowledge in the area of power engineering and especially: energy strategies and resources, electric power conversions, technology and transformations, energy efficiency and energy management.

Description of the Discipline: In this course the students will acquire knowledge, connected to: electric power conversions and the technical installations, connected to this process, electro energy strategies, electro technical installations for providing comfort

Prerequisites: The discipline is directly connected to specialized courses as: FpBEE02, FpBEE09, FpBEE18, FpBEE21, BpEE24, BpEE30, BpEE31, BpEE32, BpEE34, BpEE36 и BpEE37.

Type of the Course: Lectures

Assessment Methods: Two exams (80%) and participation in class (20%)

Language of Instruction: Bulgarian

Recommended Reading:

BIBLIOGRAPHY:

1. Влъчков П., Електрически мрежи и системи, София, ДИ "Техника", 1989;
2. Генов Л. Електроенергетика, София, ДИ "Техника", 1985;
3. Димитров А., Съвременна топлотехника и енергетика, София, 2011;
4. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и високо напрежение, Лектура, 2006;
5. Нотов П., С. Неделчева, Електроенергетика I и II част, София, 2009;
6. Николов Д., Електрически мрежи и системи, София, ДИ "Техника", 1994.

COURSE DESCRIPTION

CourseTitle: Electrical Machinery – Part 2	Code: BpEE36	Semester: 6
Type of Teaching: Lectures, Seminars and Laboratory work, Course work	Hours per week: L – 3 hours, S – 2 h, LW – 2 h, CW - 1h, Self Study - 7h.	Credits: 8

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Vasil Drambalov, Ph.D., e-mail: drambalov@abv.bg, Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Bachelor of Science.

COURSE OBJECTIVES: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – synchronous machines, d.c. machines, micromachines and electrical machines used in automation. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

COURSE DESCRIPTION: Basic topics: Synchronous machines – design and principle of operation. Armature reaction at resistive, resistive-inductive, inductive and capacitive load. Magnetic field and parameters of synchronous machines. Method of the two reactions for salient-pole synchronous machine. Voltage equations and vector diagrams of saturated and non-saturated synchronous machine. Characteristics of synchronous generators. Parallel operation of synchronous machines. Modes of operation of synchronous machines at parallel operation. V-shape characteristics. Angular characteristics. Synchronous motors – vector diagram, operational characteristics and starting. Synchronous compensators. Asymmetrical modes and transients in synchronous machines. Design, principle of operation and modes of operation of d.c. electrical machines. Windings of d.c. machines. Electromotive force in armature winding. Electromagnetic torque and electromagnetic power. Armature reaction and its influence on machine operation. Commutation in d.c. machines. D.c. generators. Characteristics of independent excitation generator. Parallel excitation generators – conditions for self-excitation and characteristics. Characteristics of series and compound generators. Parallel operation of d.c. generators. D.c. motors – types and characteristics. Steady operation. Starting and speed control of d.c. motors. Braking modes of d.c. motors. A.c. commutator motors. D.c. micromachines. Brushless d.c. motors. Main dimensions, volume and weight of electrical machines. Heating and cooling of electrical machines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements, Electrical machinery part 1.

TEACHING METHOD: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHODS OF EXAMINATION AND ASSESSMENT: Laboratory exercises (20 %), course work with two tasks (20 %) and written exam at the end of the 6th semester (60 %).

TEACHING LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, ч. 2, София, Техника, 1988. 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – втора част, Пловдив, Академично издателство на Аграрния университет, 2004. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

COURSE DESCRIPTION

Name of the course: Electrical apparatus II	Code: BpEE37	Semester: 6
Type of teaching: Lectures, seminar exercises, laboratory work, course work and self-study	Lessons per week: L – 3 hours, SE – 1 hour, LW – 2 hours, Self-study – 6 hours.	Number of credits: 7

LECTURER: Principal Assistant Ivan Hadzhiev, Ph.D., Technical University of Sofia, Plovdiv Branch, Faculty of Electronics and Automation, Department of Electrical Engineering, Phone: (032) 659686, e-mail: hadzhiev_tu@abv.bg.

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in “Electrical Engineering” at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, for receiving the Bachelor of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will have acquired knowledge of the physical processes and dependencies of the processes of switching in electrical circuits, arcing horns, contact systems and insulation structures of the electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Characteristics and conditions for burning and extinguishing electric arc; Arcing devices in AC and DC; Switching circuits, surge, etc.; Physical phenomena in the contact area of the electrical connections; Constructions of commutative and non-commutative contact connections; Contact materials; Insulation construction of electrical apparatus-influencing factors, coordination and protection of insulation, methods for improving the breakdown voltage.

PREREQUISITES: Mathematics, Physics, Chemistry, Mechanics, Theoretical electrical engineering, Electrical measurements, Electrical apparatus – part I.

TEACHING METHODS: Lectures, prepared for multimedia presentation, seminars and laboratory exercises, during which problems are solved and experiments, related to the topics of the lectures are conducted.

METHOD OF ASSESSMENT: Laboratory work (15%), seminar exercises (20%), written examination (65%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Yatchev I., Al. Alexandrov, Electrical Apparatus - part II, Avangard Prima, Sofia, 2010 (Bulgarian).
2. Maslarov I., S. Shishkova-Panaiotova, Laboratory experiments on electrical machines and apparatus, Plovdiv, 2000 (Bulgarian).
3. Pisarev, A.N. and others, Guide the design of switchgear for low voltage Sofia, Technics, 1987 (Bulgarian).
4. Tseneva R., Electrical contact, Sofia, 2004 (Bulgarian).
5. Pisarev A., Lichev A., Design of switchgear for low voltage, Sofia, Technics 1987 (Bulgarian).
6. Taev I., Fundamentals of the theory of electrical apparatus, Moscow, 1987 (Russian).

DESCRIPTION OF THE COURSE

Name of the course Power Electronics	Code: BpEE38	Semester: 6
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 2 hour	Number of credits: 5

LECTURER: Prof. Ph.D. Georgi Ganev – tel.: 032 659 560,
Department of Electrical Engineering email: gganev@tu-plovdiv.bg
Technical University of Sofia, Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Compulsory course for students specialty Electrical Engineering Bachelor Engineering program of the Faculty of Electronics and Automation.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students' are expected to be able to apply to use different power converters - to maintain some complete power converters, to design new systems and objects including power converters, to choose and procure complete power converters.

DESCRIPTION OF THE COURSE: The main topics concern: Power converters applications in electrical production, transmissions and consumptions; Converters classification based on their main functions; Power conversion methods applied in power converters; Main power converters characteristics versus supply grid or supply load; Converters cooling; Classification, characteristics and parameters of main converters block structure; Review and comparison of conventional and modern converter schemes (AC/DC; AC/AC; DC/AC and DC/DC converters); Methods for power converters control; Electromagnetic compatibility; Requirements to the converters; Choice of complete power converters.

PREREQUISITES: Theory of Electrical Engineering, Electrical Engineering Materials, Electrical Measurements, Electrical machines, Semiconductor Devices, Electronics

TEACHING METHODS: Lectures using multimedia presentations. Laboratory works using laboratory models and real converters and PC simulations; Laboratory results are checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of semester. The final mark is the aggregate of the written exam (75%) and the laboratory work (25%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Минчев М., Й.Шопов, Е.Рац, Преобразователна техника, Сиела, София, 2006
2. Rashid M., Power Electronics Handbook, Academic Press, London, UK, 2001.
3. Scvarenina T., The Power Electronics Handbook, CRC Press, Indiana, USA, 2002.
4. Asha E., V.G.Angelidis, O.Anaya-Lara, T.J.E.Miller, Power Electronic Control in Electrical Systems, Newnes Power Engineering Series, London, 2002
5. Segurier G., Les convertisseurs de l'électronique de puissance, vol.1,2,3,4, TEC-DOC, Paris, 1995;
6. Силовая электроника: примеры и расчеты, Техника, Москва, 1982;

COURSE DESCRIPTION

Name of the course: Design of Electrical Machines	Code: BpEE39	Semester: 6
Type of teaching: Lectures, Laboratory Work, and Course Project.	Lessons per week: L – 3 hours, LW – 2 h, Course Project – 1 h, Self Study – 5 h.	Number of credits: 6

LECTURER: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory course for all full-time and part-time undergraduate students at the Faculty of Electronics and Automatics studying B.Eng. programme.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint students with the electrical, magnetic, insulation, thermal and mechanical design of rotating electric machines.

DESCRIPTION OF THE COURSE: Modern trends in the design of electric machines. Determination of the main dimensions of induction machines. Determination of electromagnetic loads of induction machines. Types of windings of electric machines. Calculation of the stator winding for alternating current. Calculation of the short-circuited rotor winding of an induction motor. Stator and rotor slots for windings of electric machines. Determination of the geometrical characteristics of a stator and a rotor sheet for induction machines. Calculating the magnetic circuit of induction machines. Thermal and ventilation calculations of electrical machines. Calculation of the starting and operating characteristics of an induction motor with short-circuited rotor.

PREREQUISITES: Mathematics, Physics, Theoretical Electrical Engineering, Electrical Machines and Electrical Apparatuses.

TEACHING METHODS: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are conducted in a computer room. Every student prepares an individual project of a rotating electric machine.

METHOD OF ASSESSMENT: Laboratory exercises (20%) and exam (80%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Копилов И. П. и др., Проектиране на електрически машини, София, Техника, 1988. 2. Тодоров Г., С. Шишкова, Г. Ганев, Ръководство – работна тетрадка по проектиране на електромеханични устройства. Част първа – Трифазен асинхронен двигател, София, 2004. 3. Голдберг О. И др., Проектирование электрических машин, Москва, 2001. 4. Кацман М., Расчет и конструирование электрических машин, Москва, Энергоатомиздат, 1984. 5. Волдек А., Электрически машини, София, Техника, 1978. 6. Норенков И. П., Автоматизированное проектирование, Москва, Высшая школа, 2000.

COURSE DESCRIPTION

Name of the course: Management	Code: BpEE40	Semester: VI
Type of teaching: Lectures, Seminar exercises	Lessons per week: L – 2, SE– 1	Number of credits: 4

LECTURERS: Chef assistant prof. Desislava Shatarova, PhD, tel.659 716; email: desislava_shatarova@abv.bg; Technical University of Sofia, Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Elective course for "Electrical Engineering", Bachelor students..

AIMS AND OBJECTIVES OF THE COURSE: Learning the basic theoretical concepts of management today as well as the main elements of production management, students will be able to apply the approaches, methods and techniques for analysis and management of industrial systems, subsystems, enterprises and companies.

COURSE DESCRIPTION: Main topics: Basic functions of management in industrial enterprises: planning, organization, motivation and control, Human resource management, Management decisions, *Building an effective teamwork*.

PREREQUISITES: Basic knowledge of Economics, Human resources management, Fundamentals of management, Humanities, mathematical, engineering, technological, managerial and technical disciplines.

TEACHING METHODS: Lectures and seminars supported by audio, video and multimedia equipment. Active teaching methods, constantly engaging the students, are used.

METHODS OF ASSESSMENT: The level of achieving the goal of the courses monitored by ongoing assessment, expressed in a grade, formed by three components: two control tests with a weight of 0.35 each and evaluation of the performance during the seminars by a factor of 0.30.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

Basic literature

1. Ангелов, А., Основи на управлението, "Полина комерс", София, 2009;
2. Иванов, Ив. Основи на мениджмънта, "Макрос", Пловдив, 2003;
3. Мирчев А., Производствен Мениджмънт, Princeps, 1996;
4. Станчева А., Основи на управлението, СТЕНО, 2006;
5. Илиев Й., и др., Организация на индустриалната фирма, университетско издателство „Стопанство“, 2002;
6. Савов, В., Основи на управлението, Университетско издателство "Стопанство", София, 1996;
7. Христов, Ст., Бизнес мениджмънт, Университетско издателство "Стопанство", София, 1998;
8. Армстронг, М., Преуспяващият мениджър, "Делфин-прес", Бургас, 1993;
9. Мескон, М., Альберт М., Хедоури, Фр., Основы мениджмънта, "Дело", Москва, 1992;
10. Донъли, Дж. Х., Гибсън Дж.Л., Иваничевич, Дж.М., Основи на мениджмънта, София, 1997;
11. Дракър, П., Управление на организации с идеална цел: "Принципи и практика", Фондация "София", София, 1997;
12. Griffin, R.W., Managementq Texas A&M University, 1996;
13. Appleby K., Modern Business administration, Fifth Editionq Pitman Publishing, 1991.

Additional literature

1. Дракър П. Ефективното управление, Класика и стил, С. 2002.
2. Ташев А. и др. Мениджмънт на човешките ресурси, ТУ – София, филиал Пловдив 2004.
3. Ташев, Гигова, Михова Ръководство за упражнения по МЧР, ТУ – София, филиал Пловдив 2007.

COURSE DESCRIPTION

Course Title: Electrical Machinery – Part 1	Code: BpEE30	Semester: 5
Type of Teaching: Lectures, Seminars and Laboratory work, Course work	Hours per week: L – 3 hours, S – 2 h , LW – 2 h, CW - 1 h, Self Study – 7 h.	Credits: 8

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Vasil Drambalov, Ph.D., e-mail: drambalov@abv.bg, Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Bachelor of Science.

COURSE OBJECTIVES: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – transformers, induction motors, special induction motors and induction micromotors. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

COURSE DESCRIPTION: Basic topics: Transformers – design and principle of operation. Voltage equations, equivalent diagrams and vector diagrams of single-phase two-winding transformer. Transformer operation at no-load, short circuit and loading. Calculation of the transformer magnetic circuit. Schemes and groups of connection of transformers. Parallel operation. Voltage control in transformers. Autotransformers – equations, equivalent diagrams and vector diagrams. Three-winding transformers - equations and equivalent diagrams. No-load, short-circuit and loading modes of three-winding transformers. Asymmetrical modes and transients in transformers. Theory of a.c. machines. Windings of a.c. machines. Electromotive force in a.c. windings. Magnetomotive force in a.c. windings. Induction machine at locked rotor. Referring the rotor winding to stator winding. Voltage equations and equivalent diagrams of induction machines. Operation of induction machine as motor, generator and counterswitching mode – power relationships and vector diagrams. Rotating torques, circular diagram and characteristics of induction machine. Starting of three-phase induction motors and speed control. Squirrel cage induction motors with current displacement in rotor winding. Operation of induction motors under non-rated conditions. Special induction machines. Single-phase and capacitor induction motors. Induction micromachines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements.

TEACHING METHOD: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHODS OF EXAMINATION AND ASSESSMENT: Laboratory exercises (20 %), course work with two tasks (20 %) and written exam at the end of the 5th semester (60 %).

TEACHING LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, част първа, София, Техника, 1988; 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – първа част, Пловдив, Академично издателство на Аграрния университет, 2002. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

COURSE DESCRIPTION

Name of the course: Electrical apparatus I	Code: BpEE31	Semester: 5
Type of teaching: Lectures, seminar exercises, laboratory work, course work and self-study	Lessons per week: L – 3 hours, SE – 1 hour, LW – 2 hours, Self-study – 6 hours.	Number of credits: 7

LECTURER: Principal Assistant Ivan Hadzhiev, Ph.D., Technical University of Sofia, Plovdiv Branch, Faculty of Electronics and Automation, Department of Electrical Engineering, Phone: (032) 659686, e-mail: hadzhiev_tu@abv.bg.

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in “Electrical Engineering” at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, for receiving the Bachelor of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will be acquainted with the underlying essence of the heat, electrodynamic and electromagnetic processes and phenomena, as well as with the application of the studied dependencies for calculation of the components of electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Electrodynamic phenomena in electrical apparatus – methods for calculating the electrodynamic forces and moments at direct, alternating and short circuit currents; Heating and cooling in electrical apparatus – heat transfer, stable and transient processes at heating and cooling, at short circuit, thermal stability of the apparatus; Electromagnetic systems – magnetic circuits for direct and alternating current, electromagnets and magnetic circuits with permanent magnets, dynamics and time of triggering the electromagnets, calculation of their coils; Static electromagnetic devices – inductors, reactors etc.; Electromagnetic actuators, electromagnetic sensors and special transformers.

PREREQUISITES: Knowledge of Physics, Mathematics, Mechanics, Theoretical Electrical Engineering, Electrical materials, Electrical Measurements.

TEACHING METHODS: Lectures, prepared for multimedia presentation, seminars and laboratory exercises, during which problems are solved and experiments, related to the topics of the lectures are conducted.

METHOD OF ASSESSMENT: Laboratory work (15%), seminar exercises (20%), written examination (65%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Alexandrov A., Electrical apparatus - part I, Electromagnetic and thermal problems, Heron Press, Sofia, 2002, 337, ISBN 954-580-117-4 (Bulgarian).
2. Maslarov I., S. Shishkova-Panaiotova, Laboratory experiments on electrical machines and apparatus. Plovdiv, 2000 (Bulgarian).
3. Alexandrov A., H. Gergova, V. Piperov, Guide seminars on electrical apparatus, Sofia, 2000 (Bulgarian).
4. Malamov D., Design of drive electromagnets: Part One: Electromagnets for constant voltage Part Two: Electromagnets the AC power frequency, Plovdiv, MACROS, 2013 (Bulgarian).
5. Pisarev A., A. Lichev, Design of switchgear for low voltage, Sofia, Technics 1987 (Bulgarian).

DESCRIPTION OF THE COURSE

Name of the course: High Voltage Engineering	Code: BpEE32	Semester: 5
Type of teaching: Lectures; Laboratory work.	Lessons per week: L - 2 hours; LW - 2 hours.	Number of credits: 5

LECTURERS: Assoc. Prof. PhD. Stanimir Stefanov (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv;
As. PhD. Ilko Turpov, (FEA), 032659583, e-mail: stsb_plovdiv@abv.bg, Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for the major Electrical Engineering of the Faculty of Electrical Engineering and Automation, Bachelor of science.

AIMS AND OBJECTIVES OF THE COURSE:: The subject aims at introducing students to new theoretical knowledge and practical skills in different fields: isolation characteristics of electric high voltage systems; over-voltages in electric networks and devices, over-voltage protection, selection of isolation levels in the high voltage systems.

DESCRIPTION OF THE COURSE: Insulation characterizations of electric power equipment and grid –electrical break in air, variety test voltage of equipment, insulation characterizations of insulation, effect crown, skin discharges; Stability over-voltage – by earth connections, resonance over-voltages, resonance increase of the voltage by end of distribution line, over-voltage by drop out of the load; Commutation over-voltages – by turn off reactive loads, by earth's connections through cutting off arc, by turn off short circuit, by turn on long distribution lines; Lightning's over-voltages – electromagnetic processes, characterizations of lightning activity, specific number of turn off by lightnings, valve down-leads, lightning's over-voltage in electrical outfits, over-voltage in coil of transformer; Coordination of isolation – determinist and static coordination, chose of isolation levels.

PREREQUISITES: The course of lectures is based on knowledge of FpBEE02, FpBEE09, FpBEE10, FpBEE18 and BpEE24.

TEACHING METHODS: Lectures. Labs are conducted in accordance whit the lab books and reports prepared by the students and checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of the semester (70%), laboratories (20%) and participation in lectures (10%).

INSTRUKTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Тодорова. А., Записки лекции по Техника на високите напрежения, ТУ – София.
2. Генов Л., Техника на високите напрежения в електроенергийните системи, ДИ "Техника", София, 1992.
3. Нанчев Н., М. Георгиев, Техника на високите напрежения, ДИ "Техника", София, 1997.
4. Вълчев М., М. Георгиев, А. Тодорова, Г. Дюстабанов, П. Тошев, Ръководство за лабораторни упражнения по техника на високите напрежения, ДИ "Техника", София, 1976.
5. Иванов Кр., П. Петров, Техника на високите напрежения. Ръководство за лабораторни упражнения. "Принт", Габрово, Ръководство за лабораторни упражнения, 2000.

COURSE DESCRIPTION

Name of the course Telecommunication Techniques	Code: BpEE33	Semester: 5
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 1 hour, Self Study – 3 hours	Number of credits: 3

LECTURER: Assis. prof., PhD, Stoian Avramov (FME), Department of Transport and Aircraft Equipment and Technologies (TAETD), [tel:032/ 659 708](tel:032/659708) Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the bachelor students specialty “ELECTRICAL ENGINEERING”.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course students must know the main principles and methods of building, maintaining and using of modern telecommunication systems.

DESCRIPTION OF THE COURSE: Main topics concern: Introduction to communication networks and communications systems protocol models with emphasis on the basic OSI 7-layer Model, media infrastructure and hardware interfaces. Communications systems architectures, including PSTN – POTS, ISDN; TV and radio broadcast, CATV, WANs, MANs, LANs – Ethernet, Token ring, Internet and information highway technologies; cellular networks - GSM, satellite, mobile and wireless technologies etc. Foundations of transmission media, signalling, coding, error detection and correction, addressing, routing, data compression, and access protocols.

PREREQUISITES: Basic courses for the “ELECTRICAL ENGINEERING” specialty.

TEACHING METHODS: Lectures, using slides and multimedia, laboratory exercises, telecommunication sites and companies visits.

METHOD OF ASSESSMENT: Test (100%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Roger L. Freeman, Telecommunication System Engineering, ISBN: 978-0-471-72620-3, Wiley, 2015
2. J. Dunlop; D. Smith, Telecommunications Engineering, ISBN: 978-1-461-58006-5, Springer, 2014
3. Христов Хр., Мирчев С., Недялчев Н. Основи на телекомуникациите. С., Нови знания, 2004
4. Мерджанов П. Телекомуникационни мрежи, ч. I, С., Нови знания, 2002
5. Столингс В. Компьютерные системы передачи данных. М., "Вильямс", 2002.

COURSE DESCRIPTION

Name of the course: Lighting and Installation Technology	Code: BpEE34	Semester: 5
Type of teaching: Lectures; Laboratory work.	Lessons per week: L - 2 hours; LW – 1 hour.	Number of credits 4

LECTURER: Assoc. Prof. PhD. Stanimir Stefanov (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Eligible subject for the major Electrical Engineering of the Faculty of Electrical Engineering and Automation, Bachelor of Science.

AIMS AND OBJECTIVES OF THE COURSE: The objectives of the course “Lighting and Installation Technology” are extending students’ knowledge in the field of photometry and colorimetry, the component base of lighting and installation technique, the physiological optics, design and exploration of lighting systems, lighting and signaling electrical installations.

DESCRIPTION OF THE COURSE: The subject of the course is directly connected with the profile of the major and covers theoretical bases in lighting technology; structure, parameters and applications of light sources and luminaries; requirements, calculations and methods for design of interior and exterior lighting systems, specific requirements, methods for sizing and design of lighting and signaling electrical installations.

PREREQUISITES: The course is conducted on the basis of knowledge from the courses: FpBEE02, FpBEE09, FpBEE10, FpBEE18 and BpEE24.

TEACHING METHODS: Lectures. Labs are conducted in accordance with the lab books and reports prepared by the students and checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of the semester (70%), laboratories (20%) and participation in lectures (10%).

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Пачаманов А. Електроснабдяване и осветителна техника. Част 1. Основи на осветителната техника; Част 2. Проектиране на осветителни уредби и електрически инсталации, ТУ - София 2002, 2004.
2. Иванов З. Осветителна и инсталационна техника, София, Авангард Прима, 2010.
3. Пачаманов А. Електроснабдяване и осветителна техника. Част 3. Ръководство-работна тетрадка за курсов проект по осветителна и инсталационна техника, Авангард Прима, София 2004.
4. Пачаманов А., Нели Рац. Ръководство за лабораторни упражнения по осветителна и инсталационна техника. Авангард Прима, София, 2005.
5. Василев Н., Промислено осветление, София, Техника, 1973.
6. Диканаров Г. Ръководство за лабораторни упражнения по осветителна и инсталационна техника, София, АВС Техника, 2002.
7. Пачаманов А., Б. Прегъзов, Д. Бибев. Специални осветителни уредби - ръководство за лабораторни упражнения и самостоятелна подготовка, София, Авангард, 2003.
8. Андрейчин Р. и др. Наръчник по осветителна техника - том I и том II. София, Техника, 1977.
9. БДС EN 12464.
10. БДС EN 13201.
11. НАРЕДБА №3 от 9.06.2004 г. за устройство на електрическите уредби и електропроводните линии..

CHARACTERISTICS OF THE COURSE

Name of the course: Power engineering	Course Code: BpEE35	Semester: 5
Type of the course: Lectures	Lectures: 2 hours	ECTS Credits: 5

Lecturer: Chief Asst. Dr. Ilko Tarpov, Chair of Electrical Engineering, Tel.: 032659583, e-mail: stsb_plovdiv@abv.bg, Technical University of Sofia, Branch Plovdiv

Disciplinary Status of the Course: Mandatory discipline for the students enrolled in Electrical Engineering of the Chair of Electrical Engineering and Automation, Bachelor's Degree.

Goal of the Course: The goal of the course is for the students to acquire basic theoretical knowledge in the area of power engineering and especially: energy strategies and resources, electric power conversions, technology and transformations, energy efficiency and energy management.

Description of the Discipline: In this course the students will acquire knowledge, connected to: electric power conversions and the technical installations, connected to this process, electro energy strategies, electro technical installations for providing comfort

Prerequisites: The discipline is directly connected to specialized courses as: FpBEE02, FpBEE09, FpBEE18, FpBEE21, BpEE24, BpEE30, BpEE31, BpEE32, BpEE34, BpEE36 и BpEE37.

Type of the Course: Lectures

Assessment Methods: Two exams (80%) and participation in class (20%)

Language of Instruction: Bulgarian

Recommended Reading:

BIBLIOGRAPHY:

1. Влъчков П., Електрически мрежи и системи, София, ДИ "Техника", 1989;
2. Генов Л. Електроенергетика, София, ДИ "Техника", 1985;
3. Димитров А., Съвременна топлотехника и енергетика, София, 2011;
4. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и високо напрежение, Лектура, 2006;
5. Нотов П., С. Неделчева, Електроенергетика I и II част, София, 2009;
6. Николов Д., Електрически мрежи и системи, София, ДИ "Техника", 1994.

COURSE DESCRIPTION

CourseTitle: Electrical Machinery – Part 2	Code: BpEE36	Semester: 6
Type of Teaching: Lectures, Seminars and Laboratory work, Course work	Hours per week: L – 3 hours, S – 2 h, LW – 2 h, CW - 1h, Self Study - 7h.	Credits: 8

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Vasil Drambalov, Ph.D., e-mail: drambalov@abv.bg, Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Bachelor of Science.

COURSE OBJECTIVES: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – synchronous machines, d.c. machines, micromachines and electrical machines used in automation. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

COURSE DESCRIPTION: Basic topics: Synchronous machines – design and principle of operation. Armature reaction at resistive, resistive-inductive, inductive and capacitive load. Magnetic field and parameters of synchronous machines. Method of the two reactions for salient-pole synchronous machine. Voltage equations and vector diagrams of saturated and non-saturated synchronous machine. Characteristics of synchronous generators. Parallel operation of synchronous machines. Modes of operation of synchronous machines at parallel operation. V-shape characteristics. Angular characteristics. Synchronous motors – vector diagram, operational characteristics and starting. Synchronous compensators. Asymmetrical modes and transients in synchronous machines. Design, principle of operation and modes of operation of d.c. electrical machines. Windings of d.c. machines. Electromotive force in armature winding. Electromagnetic torque and electromagnetic power. Armature reaction and its influence on machine operation. Commutation in d.c. machines. D.c. generators. Characteristics of independent excitation generator. Parallel excitation generators – conditions for self-excitation and characteristics. Characteristics of series and compound generators. Parallel operation of d.c. generators. D.c. motors – types and characteristics. Steady operation. Starting and speed control of d.c. motors. Braking modes of d.c. motors. A.c. commutator motors. D.c. micromachines. Brushless d.c. motors. Main dimensions, volume and weight of electrical machines. Heating and cooling of electrical machines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements, Electrical machinery part 1.

TEACHING METHOD: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHODS OF EXAMINATION AND ASSESSMENT: Laboratory exercises (20 %), course work with two tasks (20 %) and written exam at the end of the 6th semester (60 %).

TEACHING LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, ч. 2, София, Техника, 1988. 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – втора част, Пловдив, Академично издателство на Аграрния университет, 2004. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

COURSE DESCRIPTION

Name of the course: Electrical apparatus II	Code: BpEE37	Semester: 6
Type of teaching: Lectures, seminar exercises, laboratory work, course work and self-study	Lessons per week: L – 3 hours, SE – 1 hour, LW – 2 hours, Self-study – 6 hours.	Number of credits: 7

LECTURER: Principal Assistant Ivan Hadzhiev, Ph.D., Technical University of Sofia, Plovdiv Branch, Faculty of Electronics and Automation, Department of Electrical Engineering, Phone: (032) 659686, e-mail: hadzhiev_tu@abv.bg.

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in “Electrical Engineering” at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, for receiving the Bachelor of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will have acquired knowledge of the physical processes and dependencies of the processes of switching in electrical circuits, arcing horns, contact systems and insulation structures of the electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Characteristics and conditions for burning and extinguishing electric arc; Arcing devices in AC and DC; Switching circuits, surge, etc.; Physical phenomena in the contact area of the electrical connections; Constructions of commutative and non-commutative contact connections; Contact materials; Insulation construction of electrical apparatus-influencing factors, coordination and protection of insulation, methods for improving the breakdown voltage.

PREREQUISITES: Mathematics, Physics, Chemistry, Mechanics, Theoretical electrical engineering, Electrical measurements, Electrical apparatus – part I.

TEACHING METHODS: Lectures, prepared for multimedia presentation, seminars and laboratory exercises, during which problems are solved and experiments, related to the topics of the lectures are conducted.

METHOD OF ASSESSMENT: Laboratory work (15%), seminar exercises (20%), written examination (65%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Yatchev I., Al. Alexandrov, Electrical Apparatus - part II, Avangard Prima, Sofia, 2010 (Bulgarian).
2. Maslarov I., S. Shishkova-Panaiotova, Laboratory experiments on electrical machines and apparatus, Plovdiv, 2000 (Bulgarian).
3. Pisarev, A.N. and others, Guide the design of switchgear for low voltage Sofia, Technics, 1987 (Bulgarian).
4. Tseneva R., Electrical contact, Sofia, 2004 (Bulgarian).
5. Pisarev A., Lichev A., Design of switchgear for low voltage, Sofia, Technics 1987 (Bulgarian).
6. Taev I., Fundamentals of the theory of electrical apparatus, Moscow, 1987 (Russian).

DESCRIPTION OF THE COURSE

Name of the course Power Electronics	Code: BpEE38	Semester: 6
Type of teaching: Lectures and laboratory work	Lessons per week: L – 2 hours; LW – 2 hour	Number of credits: 5

LECTURER: Prof. Ph.D. Georgi Ganev – tel.: 032 659 560,
Department of Electrical Engineering email: gganev@tu-plovdiv.bg
Technical University of Sofia, Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Compulsory course for students specialty Electrical Engineering Bachelor Engineering program of the Faculty of Electronics and Automation.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students' are expected to be able to apply to use different power converters - to maintain some complete power converters, to design new systems and objects including power converters, to choose and procure complete power converters.

DESCRIPTION OF THE COURSE: The main topics concern: Power converters applications in electrical production, transmissions and consumptions; Converters classification based on their main functions; Power conversion methods applied in power converters; Main power converters characteristics versus supply grid or supply load; Converters cooling; Classification, characteristics and parameters of main converters block structure; Review and comparison of conventional and modern converter schemes (AC/DC; AC/AC; DC/AC and DC/DC converters); Methods for power converters control; Electromagnetic compatibility; Requirements to the converters; Choice of complete power converters.

PREREQUISITES: Theory of Electrical Engineering, Electrical Engineering Materials, Electrical Measurements, Electrical machines, Semiconductor Devices, Electronics

TEACHING METHODS: Lectures using multimedia presentations. Laboratory works using laboratory models and real converters and PC simulations; Laboratory results are checked by the supervisor.

METHOD OF ASSESSMENT: Written exam at the end of semester. The final mark is the aggregate of the written exam (75%) and the laboratory work (25%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Минчев М., Й.Шопов, Е.Рац, Преобразователна техника, Сиела, София, 2006
2. Rashid M., Power Electronics Handbook, Academic Press, London, UK, 2001.
3. Scvarenina T., The Power Electronics Handbook, CRC Press, Indiana, USA, 2002.
4. Asha E., V.G.Angelidis, O.Anaya-Lara, T.J.E.Miller, Power Electronic Control in Electrical Systems, Newnes Power Engineering Series, London, 2002
5. Segurier G., Les convertisseurs de l'électronique de puissance, vol.1,2,3,4, TEC-DOC, Paris, 1995;
6. Силовая электроника: примеры и расчеты, Техника, Москва, 1982;

COURSE DESCRIPTION

Name of the course: Design of Electrical Machines	Code: BpEE39	Semester: 6
Type of teaching: Lectures, Laboratory Work, and Course Project.	Lessons per week: L – 3 hours, LW – 2 h, Course Project – 1 h, Self Study – 5 h.	Number of credits: 6

LECTURER: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Faculty of Electronics and Automation, Phone: (032) 659535, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory course for all full-time and part-time undergraduate students at the Faculty of Electronics and Automatics studying B.Eng. programme.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint students with the electrical, magnetic, insulation, thermal and mechanical design of rotating electric machines.

DESCRIPTION OF THE COURSE: Modern trends in the design of electric machines. Determination of the main dimensions of induction machines. Determination of electromagnetic loads of induction machines. Types of windings of electric machines. Calculation of the stator winding for alternating current. Calculation of the short-circuited rotor winding of an induction motor. Stator and rotor slots for windings of electric machines. Determination of the geometrical characteristics of a stator and a rotor sheet for induction machines. Calculating the magnetic circuit of induction machines. Thermal and ventilation calculations of electrical machines. Calculation of the starting and operating characteristics of an induction motor with short-circuited rotor.

PREREQUISITES: Mathematics, Physics, Theoretical Electrical Engineering, Electrical Machines and Electrical Apparatuses.

TEACHING METHODS: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are conducted in a computer room. Every student prepares an individual project of a rotating electric machine.

METHOD OF ASSESSMENT: Laboratory exercises (20%) and exam (80%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Копилов И. П. и др., Проектиране на електрически машини, София, Техника, 1988. 2. Тодоров Г., С. Шишкова, Г. Ганев, Ръководство – работна тетрадка по проектиране на електромеханични устройства. Част първа – Трифазен асинхронен двигател, София, 2004. 3. Голдберг О. И др., Проектирование электрических машин, Москва, 2001. 4. Кацман М., Расчет и конструирование электрических машин, Москва, Энергоатомиздат, 1984. 5. Волдек А., Электрически машини, София, Техника, 1978. 6. Норенков И. П., Автоматизированное проектирование, Москва, Высшая школа, 2000.

COURSE DESCRIPTION

Name of the course: Management	Code: BpEE40	Semester: VI
Type of teaching: Lectures, Seminar exercises	Lessons per week: L – 2, SE– 1	Number of credits: 4

LECTURERS: Chef assistant prof. Desislava Shatarova, PhD, tel.659 716; email: desislava_shatarova@abv.bg; Technical University of Sofia, Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Compulsory in curriculum "Electrical Engineering", Bachelor degree course.

AIMS AND OBJECTIVES OF THE COURSE: Learning the basic theoretical concepts of management today as well as the main elements of production management, students will be able to apply the approaches, methods and techniques for analysis and management of industrial systems, subsystems, enterprises and companies.

COURSE DESCRIPTION: Main topics: Basic functions of management in industrial enterprises: planning, organization, motivation and control, Human resource management, Management decisions, *Building an effective teamwork*.

PREREQUISITES: Basic knowledge of Economics, Human resources management, Fundamentals of management, Humanities, mathematical, engineering, technological, managerial and technical disciplines.

TEACHING METHODS: Lectures and seminars supported by audio, video and multimedia equipment. Active teaching methods, constantly engaging the students, are used.

METHODS OF ASSESSMENT: The level of achieving the goal of the courses monitored by ongoing assessment, expressed in a grade, formed by three components: two control tests with a weight of 0.35 each and evaluation of the performance during the seminars by a factor of 0.30.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

1. Ангелов, А., Основи на управлението, "Полина комерс", София, 2009;
2. Иванов, Ив. Основи на мениджмънта, "Макрос", Пловдив, 2003;
3. Мирчев А., Производствен Мениджмънт, Princeps, 1996;
4. Станчева А., Основи на управлението, СТЕНО, 2006;
5. Илиев Й., и др., Организация на индустриалната фирма, университетско издателство „Стопанство“, 2002;
6. Савов, В., Основи на управлението, Университетско издателство "Стопанство", София, 1996;
7. Христов, Ст., Бизнес мениджмънт, Университетско издателство "Стопанство", София, 1998;
8. Армстронг, М., Преуспяващият мениджър, "Делфин-прес", Бургас, 1993;
9. Мескон, М., Альберт М., Хедоури, Фр., Основы мениджмънта, "Дело", Москва, 1992;
10. Донъли, Дж. Х., Гибсън Дж.Л., Иваничевич, Дж.М., Основи на мениджмънта, София, 1997;
11. Дракър, П., Управление на организации с идеална цел: "Принципи и практика", Фондация "София", София, 1997;
12. Griffin, R.W., Managementq Texas A&M University, 1996;
13. Appleby K., Modern Business administration, Fifth Editionq Pitman Publishing, 1991.