

Department of Electrical Engineering

Course Outcomes (CO)

Syllabus Pattern:-2019

Class:-BE

Semester:- I

Sr. No	Subject	Course Outcomes (CO)
1	Power System Operation & Control	<p>CO1: Summarize angle, voltage and frequency stability in the power system control (UN).</p> <p>CO2: Illustrate various ways of interchange of power between interconnected utilities (AP).</p> <p>CO3: Analyze stability and optimal load dispatch using different techniques (AN).</p> <p>CO4: Select appropriate FACTS devices for stable operation of the system (EV).</p> <p>CO5: Evaluate the stability of the system and suggest the methods to improve it (EV).</p>
2	Advanced Control System	<p>CO1. Explain compensation networks, common nonlinearities, the concept of state, sampling and reconstruction, and concepts of advanced controls (Understanding)</p> <p>CO2. Determine transfer function from state model (Applying)</p> <p>CO3. Test controllability and observability properties of the system (Evaluating)</p> <p>CO4: Design compensators, state feedback controls, and observers for the system (Creating)</p>
3	Elective-I PLC and SCADA	<p>CO1. Develop and explain the working of a PLC with the help of a block diagram.</p> <p>CO2. Classify input and output interfacing devices with PLC.</p> <p>CO3. Design PLC based application by proper selection criteria, developing GUI and ladder program.</p> <p>CO4: Execute, debug, and test the programs developed for digital and analog operations.</p> <p>CO5: Develop the architecture of SCADA and explain the importance of SCADA in critical infrastructure.</p> <p>CO6: Describe the SCADA protocols and digital control systems, along with their architecture for automation.</p>

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4	Elective-I Power Quality Management	CO1: Understand power quality and attribute of power quality CO2: Describe voltage flicker and mitigation of it CO3: Analyze the effect of power system events on voltage sag and its characteristics. CO4: Identify the sources of harmonics and harmonics produced CO5: Select proper method for harmonic mitigation along with methods of power quality monitoring. CO6: Carry out power quality monitoring using power quality analyzers.
5	Elective-I High Voltage Engineering	CO1: Identify, describe and analyze the breakdown theories of gaseous, solid and liquid materials. CO2: Analyze the occurrence of over voltage and to provide remedial solutions CO3: Describe and use of various methods of generation of high AC, DC, impulse voltage and current. CO4: Demonstrate the methods of measurement of high AC, DC, impulse voltage and current, tests on high voltage equipment and devices CO5: Study design of high voltage laboratory with all safety measures.
6	Elective-I Robotics and Automation	CO1: differentiate between types of robots based on configuration, method of control, types of drives, sensors used, etc. CO2: apply mathematical modeling of a robot for a specific application with given specifications. CO3: analyze the robot arm dynamics for calculation of torques and forces required for different joints of robots for control of the robot arm. CO4 : apply knowledge of Robot for their various applications
7	Elective-II Alternate Energy System	CO1:Analyze the performance of solar thermal and photovoltaic systems. CO2:Determine wind turbine performance. CO3:Explain and evaluate biomass resources in an Indian context. CO4:Illustrate the importance of storage systems. CO5:Analyze the economics of renewable energy sources.
8	Elective-II Electric and Hybrid Vehicle	CO1: Analyze the Life Cycle Assessment of Li-ion battery. CO2 : Describe the different types of Li-ion charging methods CO3 : Comprehend the knowledge of drivetrain hybridization. CO4 : Evaluate EV motor sizing. CO5 : Classify Battery Recycling methods.
9	Elective-II Special-Purpose Machines	CO1:Reproduce principal of operation of PMSM, Stepper motor, SRM, Switch reluctance and linear motors. CO2: Develop torque - speed and performance characteristics of above motors. CO3: Enlist application of above motors. CO4: Demonstrate various control strategies.
10	Elective-II HVDC and FACTs	CO1:Choose a proper FACTS controller for the specific application based on system requirements. CO2:Analyze shunt, series, and combined controllers to explore different benefits. CO3:Compare EHVAC and HVDC systems and to describe various types of DC links. CO4:Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems.

Sr. No	Subject	Course Outcomes (CO)
11	Project Stage-I	CO1: Define the project problem statement and identify the scope of the project. CO2: Search the appropriate research papers, standards and e-resources and write a literature survey. CO3: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project. CO4: Justify the selection of electrical, electronic and mechanical components for the project prototyping CO5: Simulate or develop a system for software or hardware verification. CO6: Write a project report with proper interpretation of results.
12	MOOCs	CO1: Enables the students to directly engage and learn from the best faculty in the country in order to strengthen the fundamentals. CO2: Explore new areas of interest in a relevant field. CO3: Enable self learning initiative in learners.. CO4: Develop critical thinking to solve complex problems in engineering, science and humanities. CO5: Improve communication skills by interacting with peers and course teachers.
13	Audit Course-VII German Language-I	CO1: Will have the ability of basic communication. CO2: Will have the knowledge of German script. CO3: Will get introduced to reading ,writing and listening skills CO4: Will develop interest to pursue profession in Indo-German Industry.
14	Engineering Economics-I	CO1: Discuss concepts related to business and its impact on enterprise. CO2: Illustrate time value of money in economic analysis.
15	Sustainability	CO1: Understand different types of environmental pollution problem. CO2: Suggest solutions for sustainable development. CO3: Develop a broader perspective in thinking for sustainable practices by utilizing engineering principle and knowledge

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Semester:- II

Sr. No	Subject	Course Outcomes (CO)
1	Switchgear and Protection	CO1: Understand the fundamentals of protective relaying. CO2: Demonstrate the arc interruption and analyze the RRRV in circuit breakers CO3: Demonstrate the construction and working principle of air brake circuit breakers, SF6 circuit breakers, and a vacuum circuit breaker. CO4: Explain the characteristics of static and digital relays and their applications in power systems. CO5: Apply the differential protection scheme to large transformers, alternators, and induction motors. CO6: Apply distance protection, three stepped protection for transmission line.
2	Advanced Electrical Drives and Control	CO1: Explain motor load dynamics and multi quadrant operation of drives. CO2: Analyze operation of converter fed and chopper fed DC drives. CO3: Apply different braking methods of D.C. and induction motor drive. CO4: Elaborate vector control for induction motor and BLDC drives. CO5: Elaborate synchronous motor, reluctance motor drive. CO6: Differentiate between classes and duty cycles of motors and select suitable drives in various industrial applications.
3	Digital Control System	CO1: Analyze digital control system and its stability. CO2: Differentiate between various control systems CO3: Present system in state space format. CO4: Design observer for system. CO5: Understand digital controllers CO6: Elaborate applications such as digital temperature control and position control
4	Restructuring and Deregulation	CO1: Identify the various institutions in the Indian power sector and explain their role in the Indian power sector . CO2: Explain the various fundamentals of power sector economics CO3: Describe the regulatory process in India and list the steps involved in tariff determination and explain the phases of tariff determination CO4: Describe and explain different power sector restructuring models and explain the concept of energy trading CO5: Explain the types of electricity markets and compare the types of electricity markets . CO6: State different transmission pricing methods and describe and compare various congestion management methods.
5	Smart Grid	CO1: Apply the knowledge to differentiate between Conventional and Smart Grid CO2: Describe importance of Supercapacitors. CO3: Identify the need of Smart metering.

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5	Smart Grid	CO4: Apply the communication technology in smart grid. CO5: Comprehend the issues of micro grid.
6	Sensor Technology	CO1: Understand the characteristics of sensors used for system monitoring and protection. CO2: Interface the various position sensors to microcontrollers. CO3: Demonstrate the characteristics of sensors used for light and image sensing
7	EHV AC Transmission	CO1: Highlight need for EHV ac transmission. CO2: Calculate line and ground parameters. CO3: Enlist problems encountered in EHV transmission. CO4: Describe the effect of electric and magnetic fields on human beings.
8	Illumination Engineering	CO1: Define and reproduce various terms in illumination. CO2: Identify various parameters for illumination system design. CO3: Design indoor and outdoor lighting systems. CO4: Enlist state of the art illumination systems.
9	Electromagnetic Fields	CO1: Describe time varying Maxwell's equations and their applications in electromagnetic problems CO2: Interpret electric and magnetic field with the help of associated laws CO3: Solve simple electrostatic and magnetic boundary conditions CO4: Determine the relationship between time varying electric and magnetic fields and electromotive force CO5: Solve electromagnetic problems with the help of mathematical tools.
10	Artificial Intelligence and Machine Learning	CO1: Evaluate Artificial Intelligence (AI) and Machine Learning (ML) methods and describe their foundations. CO2: Demonstrate knowledge of reasoning and knowledge representation for solving real world problems. CO3: Illustrate the construction of learning and expert system Discuss current scope and limitations of AI and societal implications CO4: Distinguish between different types of learning types. CO5: Apply the different supervised, unsupervised and reinforcement learning methods.
11	Project Stage II	CO1: Identify tools, techniques, methods, concepts, measuring devices, and instruments required for the project to define the methodology of the project CO2: Justify the selection of electrical, electronic and mechanical components for the project prototyping CO3: Select the appropriate testing method for system performance evaluation CO4: Interpret results obtained by simulation, and hardware implementation and decide on further action or write a conclusion CO5: Write a project report and research paper on the project work
12	German Language-II	CO1: Will have the ability of advanced communication. CO2: Will develop reading, writing and listening skills. CO3: Will understand tenses in German Language. CO4: Will develop interest to pursue a German language course
13	Engineering Economics-II	CO1: Apply various techniques for evaluation of engineering projects. CO2: Assess cash flow under risk with varying parameters.
14	GREEN BUILDING	CO1: Design green and sustainable techniques for both commercial and residential buildings. CO2: Design water, lighting, energy efficiency plan using renewable energy sources.

		Course Outcomes (CO)
		CO3:Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting CO4:Understand the concepts of green buildings