

I K Gujral Punjab Technical University
(Main campus), Kapurthala

Board Of Study Electrical Engineering


Ref No: IKGPTU/EE/630.

date: 12/12/17

Reference to the 2nd meeting of Board of Study Electrical Engineering on 06.12.2017 find attached with:

- I. Copy of the Minutes of Meeting
- II. Vision & Mission of Electrical Engineering Department of IKGPTU main campus
- III. Programme Educational objectives (PEOs) and Programme Outcomes (POs) and Course Outcomes (Cos) of:
 - a. B. Tech. (Electrical Engineering)
 - b. M. Tech. Electrical Engineering
 - c. M. Tech. (Power Engineering)
 - d. M. Tech. Electrical Engineering (Power Systems)

Submitted for kind perusal and record.


Dr Y S Brar

Chairman

BOS (Electrical Engineering)

Dean (Academic)

I K Gujral Punjab Technical University
(Main campus), Kapurthala

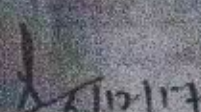
Department of Electrical Engineering

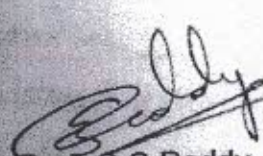
Minutes of Meeting

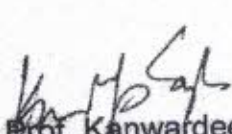
The 2nd meeting of BoS (Electrical Engg.) was held under the Chairmanship of Prof. Y S Brar in the Conference room, 2nd floor at IKGPTU dated 06.12.2017. The members discussed and approved following agenda items:

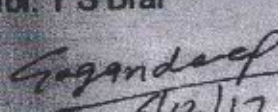
1. The members deliberated upon the draft scheme of BTech (Electrical Engg.) proposed in 1st BoS meeting held on 21-06-17, it was decided that in the light of recent AICTE guidelines regarding UG curriculum, the scheme shall be redesigned accordingly and shall be brought in the next BoS meeting.
2. Draft of Vision & Mission of the Electrical Engineering Department of IKGPTU Main campus were discussed and approved.
3. Members deliberated on the Program Educational Objectives (PEOs) and Course Outcome (COs) of B.Tech (Electrical Engg.), M.Tech (Electrical Engg.), M.Tech (Power System), M.Tech (Power Engg.) and M.Tech Electrical Engg.(Power System) and approved the draft for the same.
4. It was further discussed by the members that scheme of all MTech program of Electrical Engg. shall be revised to include atleast one lab course.

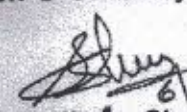
The meeting ended with a vote of thanks to the chair.

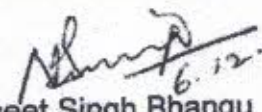

Prof. Y S Brar

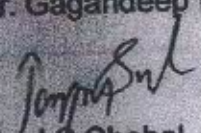

Prof. C C Reddy

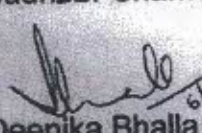

Prof. Kanwardeep Singh

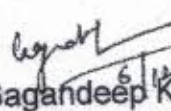

Er. Gagandeep Kaur

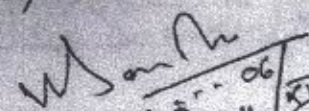

Dr. Sudhakar Sharma


Dr. Navneet Singh Bhangu


Dr. J S Chahal


Dr. Deepika Bhalla



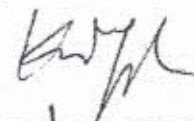
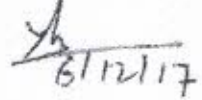

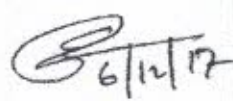
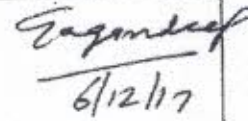
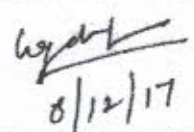
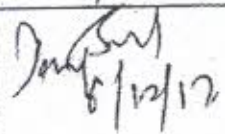


Dr. Gagandeep Kaur


Er. Navdeepak Sandhu

Attendance Sheet

Meeting of... Board of Study Electrical Engg.

held on 6/12/2017 at 11:00 AM meeting hall, Academic Deptt. IKG PTU

Sr. No.	Name & Address	Contact Number	E-Mail I.D.	Signature
1.	Dr. Sudhir Sharma. Associate Prof + Head DAVJET, Jalandhar	98722-03726	sudhir.abc@gmail.com	
2.	Dr. Navneet Singh Bhangu Asstt. Prof. EED GNDEC, Ludhiana	98722-27229	navneetbhangu@gmail.com	
3.	Dr. Kamwardeep Singh EED, GNDEC Wk.	95014-11533	KDS97DEE@gmail.com	
4.	Dr. Y.S. Brar EED, IKGPTU KPT	94780-98013	braryadwinder@yahoo.co.in	
5.	Dr. Deepika Bhalla Asst. Prof. EE IKGPTU, Kapurthala	94658-84858	dbhalla@ptu.ac.in	
6.	C. C. Reddy Associate Professor IIT. Ropar	94170-34192	reddy@iitrpr.ac.in	
7.	Gagandeep Kaur Associate Prof. IKGPTU, Jalandhar	94780-98118	gagandeepk@gmail.com	
8.	Dr. Gagan Deep Kaur Thapar University Patiala	814672-433	gagandeep@thapar.edu	
9.	Dr. Jaspreet Singh Chahal EED, IKGPTU	94658-84841	JS CHAHAL@PTU.AC.IN	
10.	Dr. Navdeep Singh Assistant Dy. Dir CCRAD) Muz MBU	94780-98040	navdeep.singh@gmail.com	

Vision

To create globally competent professionals, researchers and entrepreneurs through outcome based curriculum and experimental learning who can resolve the emerging challenges of industry, academia and society.

Mission

- ✓ To provide high quality education at the undergraduate, graduate, and post-graduate level.
- ✓ To disseminate required attributes in the field of electrical engineering. And interdisciplinary areas related to it.
- ✓ To inculcate lifelong learning ability, technical expertise, ethical standards, teamwork and leadership qualities,
- ✓ To create excellence in scholarly research at the frontiers of electrical engineering.
- ✓ To encourage faculty expertise and modern facilities to serve the industry, the profession, and other constituents in the state and the nation.

Graduate Attributes

- a. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.
- b. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- d. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- e. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- f. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
- g. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- h. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- i. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- j. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- k. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Educational Objectives

- I. **Preparation:** To prepare students to excel in undergraduate programmes or to succeed in industry/technical profession through global, rigorous education.
- II. **Core Competence:** To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems and also to pursue higher studies.
- III. **Breadth:** To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real-life problems.
- IV. **Professionalism:** To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.
- V. **Learning Environment:** To provide student with an academic environment aware of excellence, leadership, written ethical code and guidelines, and the life-long learning needed for a successful professional career.

Programme Outcomes

- (a) Graduates will demonstrate knowledge of differential equations & partial differential, laplace transformation, fourier series, vector calculus, complex variable, matrix theory, probability theory, physics, chemistry and electrical and electronics engineering, manufacturing practice; basics of thermodynamics, simple machines: mechanism of source.
- (b) Graduates will demonstrate will ability to identify, formulates and solve electrical engineering problems.
- (c) Graduate will demonstrate an ability to design electrical circuits and conduct experiments with electrical systems, analyze and interpret data.
- (d) Graduates will demonstrate an ability to design digital and analog systems and component.
- (e) Graduates will demonstrate an ability to visualize and work on laboratory and multi-disciplinary tasks.
- (f) Graduates will demonstrate skills to use modern engineering tools, software and equipment to analyze problems.
- (g) Graduates will demonstrate knowledge of professional and ethical responsibilities.
- (h) Graduate will be able to communicate effectively in both verbal and written form.
- (i) Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
- (j) Graduate will develop confidence for self education and ability for life-long learning.
- (k) Graduate who can participate and succeed in competitive examinations like GATE, GRE, GMAT, IES.

Program Educational Objectives

- I. To provide the students with ample knowledge and technical skills in Power Systems Engineering.
- II. To train them for research programmes in Power Systems Engineering, placements in power research and development organisations, to offer technical work skills to electric power industries and energy sectors, and faculty positions in reputed institutions.

Program Outcomes

A student who has undergone M.Tech. programme in Electrical Engineering with specialisation in Power Systems will:

- a) have capability to evaluate and analyse problems related to Power Systems (PS) and be able to synthesise the domain knowledge and incorporate the principles in the state of art systems for further enrichment.
- b) be able to critically examine the prevailing complex PS scenarios and arrive at possible solutions independently, by applying the acquired theoretical and practical knowledge
- c) be able to solve PS problems such as load flows, state estimation, fault analysis and stability studies.
- d) be able to develop broad-based economically viable solutions for unit commitment and scheduling
- e) be able to identify optimal solutions for improvising power transfer capability, enhancing power quality and reliability
- f) be able to evolve new schemes based on literature survey, and propose solutions through appropriate research methodologies, techniques and tools, and also by designing and conducting experiments
- g) be able to interpret power system data and work on well-defined projects with well defined goals to provide real time solutions pertaining to PS
- h) be able to develop, choose, learn and apply appropriate techniques, various resources including hardware and IT tools for modern power engineering, including prediction and modelling with an understanding of the limitations
- i) be able to develop dedicated software for analysing and evaluating specific power system problems
- j) be able to participate in collaborative-multidisciplinary engineering / research tasks and work as a team member in such tasks related to PS domain, giving due consideration to economic and financial intricacies, and lead the team in specific spheres.
- k) be able to pursue research as a career.

Program Educational Objectives

- I. To provide the students with ample knowledge and technical skills in Power Systems Engineering.
- II. To train them for research programmes in Power Systems Engineering, placements in power research and development organisations, to offer technical work skills to electric power industries and energy sectors, and faculty positions in reputed institutions.

Program Outcomes

A student who has undergone M.Tech. programme in Electrical Engineering with specialisation in Power Systems will:

- a) have capability to evaluate and analyse problems related to Power Systems (PS) and be able to synthesise the domain knowledge and incorporate the principles in the state of art systems for further enrichment.
- b) be able to critically examine the prevailing complex PS scenarios and arrive at possible solutions independently, by applying the acquired theoretical and practical knowledge
- c) be able to solve PS problems such as load flows, state estimation, fault analysis and stability studies.
- d) be able to develop broad-based economically viable solutions for unit commitment and scheduling
- e) be able to identify optimal solutions for improvising power transfer capability, enhancing power quality and reliability
- f) be able to evolve new schemes based on literature survey, and propose solutions through appropriate research methodologies, techniques and tools, and also by designing and conducting experiments
- g) be able to interpret power system data and work on well-defined projects with well defined goals to provide real time solutions pertaining to PS
- h) be able to develop, choose, learn and apply appropriate techniques, various resources including hardware and IT tools for modern power engineering, including prediction and modelling with an understanding of the limitations
- i) be able to develop dedicated software for analysing and evaluating specific power system problems
- j) be able to participate in collaborative-multidisciplinary engineering / research tasks and work as a team member in such tasks related to PS domain, giving due consideration to economic and financial intricacies, and lead the team in specific spheres.
- k) be able to pursue research as a career.

Program Educational Objectives

- I. To provide the students with ample knowledge and technical skills in Power Engineering.
- II. To train them for research programmes in Power Engineering, placements in power research and development organisations, to offer technical work skills to electric power industries and energy sectors, and faculty positions in reputed institutions.

Program Outcomes

A student who has undergone M.Tech. programme in Electrical Engineering with specialisation in Power Systems will:

- a) have capability to evaluate and analyse problems related to Power Systems (PS) and be able to synthesise the domain knowledge and incorporate the principles in the state of art systems for further enrichment.
- b) be able to critically examine the prevailing complex PS scenarios and arrive at possible solutions independently, by applying the acquired theoretical and practical knowledge
- c) be able to solve PS problems such as load flows, state estimation, fault analysis and stability studies.
- d) be able to develop broad-based economically viable solutions for unit commitment and scheduling
- e) be able to identify optimal solutions for improvising power transfer capability, enhancing power quality and reliability
- f) be able to evolve new schemes based on literature survey, and propose solutions through appropriate research methodologies, techniques and tools, and also by designing and conducting experiments
- g) be able to interpret power system data and work on well-defined projects with well defined goals to provide real time solutions pertaining to PS
- h) be able to develop, choose, learn and apply appropriate techniques, various resources including hardware and IT tools for modern power engineering, including prediction and modelling with an understanding of the limitations
- i) be able to develop dedicated software for analysing and evaluating specific power system problems
- j) be able to participate in collaborative-multidisciplinary engineering / research tasks and work as a team member in such tasks related to PS domain, giving due consideration to economic and financial intricacies, and lead the team in specific spheres.
- k) be able to pursue research as a career.

2

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering

By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

Course Code	Course Name	Course Outcomes
BTEE-101	Basic electrical and electronics engineering	<ul style="list-style-type: none"> i. Basic knowledge of fundamentals of AC and DC circuits and magnetic circuits. ii. Concept of single phase and three phase AC circuits iii. Understand the working principle, construction, applications of AC machines (static and rotating type) and DC machines, iv. The concept of transducers and digital multimeter and their applications. v. Study of semiconductor devices: diodes, transistors and operational amplifiers through developing small basic learning models.
BTEE-102	Basic electrical and electronics engineering Laboratory	<ul style="list-style-type: none"> i. Verification of the basic laws of AC and DC circuits ii. Practical use of measuring instruments and transducers iii. Verification of semiconducting device characteristics, logic gates iv. Evaluation of the parameters of a transformer v. Concept of the direction of rotation by electromagnetic forces in motors vi. Concept of three phase connection in AC circuits.

COURSE CURRICULUM FOR THIRD SEMESTER

Course Code	Course Name	Course Outcomes
BTEE-301	Circuit Theory	<ul style="list-style-type: none"> i. Evaluate the circuit quantities using the circuit theorems. ii. Analyze the transient response of a circuit to test signal. iii. Analyze AC circuits. iv. Analyze filters. v. Analyze the given equations to find out the circuit parameters. vi. Synthesize electrical networks using Foster and Cauer
BTEE-302	Transformers and Direct Current Machines	<ul style="list-style-type: none"> i. Understand the principle, construction and analyze the operation of transformers and DC machines. ii. Testing of transformer and evaluate efficiency and voltage regulation. iii. Develop basic skills in construction and analysis of equivalent circuit, phasor diagram and circuit parameters of transformer and DC machine. iv. Analyze the performance characteristics of DC machines for different operating conditions. v. Evaluate the speed control and starting method of DC motor for specific purpose. vi. Explore knowledge in context of applications of transformer and dc machines in industry.
BTEE-303	Electrical Measurements & Measuring Instrumentation	<ul style="list-style-type: none"> i. Analyze and compare different types of analog measuring instruments and their applications. ii. Evaluate power and energy by using energy meter and power factor meters. iii. Understand bridges and calculate unknown values. iv. Understand techniques and acquire skills related to application of potentiometers using instrument transformers. v. Evaluate the different types of errors in instruments. vi. Understand various magnetic measurements.
BTEE-304	Electronic Devices and Circuits	<ul style="list-style-type: none"> i. Comprehend the principle, construction, characteristics, operation and application of various electronic devices viz: Diode, BJT, FET, Special purpose Diodes and MOSFET. ii. Analyze and understand different electronic devices as a circuit element. iii. Troubleshoot, design and create electronic circuits meant for different applications. iv. Evaluate performance of electronic circuits. v. Understand the applications of amplifiers. vi. Understand the working and application of power supplies.
BTEE-305	Laboratory-I (Semiconductor Devices and Circuit Theory)	<ul style="list-style-type: none"> i. Identify and test different types of electrical and electronic components.

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
 By
Board of Studies Electrical Engineering
(as per Scheme& Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

Course Code	Course Name	Course Outcomes
		ii. Ability to make circuits on bread-board and understand the use and importance of various types of equipment's used in the laboratory. iii. Analyze, take measurements to understand circuit behavior and performance under different conditions. iv. Troubleshoot, design and create electronic circuits meant for different applications. v. Acquire experience in creating and troubleshooting simple projects employing semiconductor devices. vi. Evaluate the performance electronic circuits and working small projects employing semiconductor devices
BTEE-306	Laboratory-II (Electrical Machines-I)	i. Evaluation of equivalent circuit parameters, efficiency and voltage regulation by performing various tests on transformer. ii. Analyze three-phase transformer connections. iii. Analyze parallel operation of transformers. iv. Analyze performance characteristics of DC generators. v. Evaluate various speed controls and starting methods of DC motor. vi. Construct and analyze torque slip characteristics of DC motor.
BTEE-307	Laboratory-II (Electrical Measurements)	i. Measure precisely R, L, C, M & F by using different bridges. ii. Determine ratio error by using current & potential transformers. iii. Compute frequency by using Frequency Meter. iv. Measure three phase power and power factor by two wattmeter method v. Construct characteristic graph of potentiometer and hysteresis loop using flux meter. vi. Measurement of insulation resistance using Earth Tester.
BTEE-306	Institutional Training (undertaken after 2 nd Semester)	i. Provide hands-on exposure to the student ii. Inculcate team management skills iii. Foster communication skills iv. Expose the student to solve real life problems

COURSE CURRICULUM FOR FOURTH SEMESTER

Course Code	Course Name	Course Outcomes
BTEE-401	Asynchronous Machines	<ul style="list-style-type: none"> i. Understand the principle, construction and analyze the operation of three phase induction motor. ii. Design and analysis of equivalent circuit for construction of phasor diagram and evaluation of various circuit parameters of induction machine. iii. Interpolate the performance and construct torque slip characteristics of an induction motor. iv. Interpret the different techniques for the speed control and starting of an induction motor. v. Analyze different types of fractional horse power motors. vi. Comprehend and solve industry related problems in context of induction motors.
BTEE-402	Linear Control Systems	<ul style="list-style-type: none"> i. Analyze the Control Systems by Transfer Function Models. ii. Evaluate the Transfer Function Models using Block Diagram Reduction or Signal Flow Graph. iii. Evaluate critical Time Response of Control Systems. iv. Design and construct the Frequency Response of Control Systems. v. Evaluate the Stability Analysis of Control Systems. vi. Design various types of Compensators.
BTEE-403	Electromagnetic Fields	<ul style="list-style-type: none"> i. Apply vector calculus to solve field theory problems. ii. Comprehend the relations between divergence, curl & gradient and analysis for different coordinate systems in electromagnetics and their interrelations. iii. Understand the concept of electric and magnetic fields and associated quantities in different coordinates. iv. Understand the concept of time varying fields and boundary conditions. v. Demonstrate different aspects of plane wave in dielectric and conducting media vi. Acquire skills to examine technical issues related to electromagnetic fields.
BTEE-404	Digital Electronics	<ul style="list-style-type: none"> i. Understand the difference between analog and digital systems. ii. Retrieve different laws and rules of Boolean algebra. iii. Analyze the steps involved in designing digital systems which involve combinational, sequential and state machines. iv. Create different digital to analog and analog to digital Converter. v. Understand the concept of semiconductor memories and create digital specific application based working projects.

BTEE-405	Power Systems-I (Transmission & Transmission)	<ul style="list-style-type: none"> i. Calculate and justify the economical size of conductor to be used in power system. ii. Distinguish and propose the types of transmission lines on the basis of tower and conductor configuration. iii. Evaluate surge impedance loading and string efficiency of insulators. iv. Construct the circle diagram of long transmission line based on ABCD constants. v. Compare the different types of underground cables and perform tests on these cables. vi. Understand line parameters of transmission lines and judge its effects on efficiency of transmission line
BTEE-406	Power Plant Engineering	<ul style="list-style-type: none"> i. Acquaint students with both steam generation and electricity production and to present some of the engineering calculations encountered in practice. ii. Describe sources of energy and types of power plants. iii. Analyze different types of steam cycles and estimate efficiencies in a steam power plant. iv. Describe basic working principles, performance characteristics and components of gas, nuclear and diesel power plants. v. Classify different types of coupled vapor cycles and list the advantages of combined cycles power plant. vi. List types, principles of operations, components and applications of steam turbines, steam generators, condensers, feed water and circulating water systems and estimate different efficiencies associated with such systems. vii. Define terms and factors associated with power plant economics and calculate present worth depreciation and cost of different types of power plants.
BTEE-407	Laboratory -IV (Instrumentation & Measuring Devices)	<ul style="list-style-type: none"> i. Measure precisely R, L, C, M & F by using different bridges. ii. Determine ratio error by using current & potential transformers. iii. Compute frequency by using Weston Frequency Meter. iv. Measure three phase power and power factor by two wattmeter method v. Construct characteristic graph of potentiometer and hysteresis loop using flux meter. vi. Measurement of insulation resistance using Earth Tester.
BTEE-408	Laboratory -V (Control Systems)	<ul style="list-style-type: none"> i. Evaluate and imply basic control hardware models in software based approach. ii. Check the time domain response and obtain performance parameters of a first order and second order systems. iii. Compare linear and nonlinear control characteristics with their applications.

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

		<ul style="list-style-type: none"> iv. Analyze errors of physical system models from an electrical equivalent. v. Analyze and explore the applications & characteristics of servo motors. vi. Evaluate the concept of stability and able to apply various techniques to find out vii. stability.
BTEE-409	Laboratory -VI (Electronic Circuits)	<ul style="list-style-type: none"> i. Understanding of basic electronic components ii. Understanding of the characteristics of electronic devices iii. Measure voltage, frequency and phase of any waveform using CRO. iv. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator. v. Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.,
EE-212	Lab-VII (Electric Machines-I Lab)	<ul style="list-style-type: none"> i. Construct equivalent circuits for single phase and three phase induction motor by performing no-load and blocked rotor test. ii. Comprehend the requirement of starting and speed control methods of induction motors in the various applications of industry. iii. Construct equivalent circuits of synchronous generator and motor. iv. Apply knowledge to show utility of alternator, synchronous motors and synchronous condenser for various applications in power system. v. Construct characteristic curves for induction motors and synchronous machines. vi. Compare various methods of parallel operation of three phase alternators.

COURSE CURRICULUM FOR FIFTH SEMESTER

Course No.	Subject	Course Outcomes
BTEE-501	Synchronous Machines	<ul style="list-style-type: none"> i. Knowledge of the single phase and three phase AC machines- their construction, working principle, performance characteristics and their applications. ii. Students are familiar about the various aspects of synchronous motor applications as constant speed motor. iii. Knowledge of ac generators at constant load and variable excitations. iv. Aspects of parallel operation of synchronous machines, synchronization of alternators in thermal and hydro power plants. v. Introduction to transient stability of synchronous machines
BTEE-502	Electrical Generation and Economics	<ul style="list-style-type: none"> i. Knowledge and understanding of various types of electric generating plants based on load and demand. ii. Knowledge of economic issues related to power plants/generation in general and thermal plants in particular. iii. Concepts of hydrothermal coordination. iv. Impact of power generation on pollution and environment. v. Selection of site of various types of power plants and benefits of cogeneration.
BTEE-503	Microprocessors	<ul style="list-style-type: none"> i. Clarity of the architecture of 8085 and 8086, and its instructions set. ii. Comparing microprocessors of different manufacturers. iii. Ability for performing various operations using instruction set codes. iv. Concept of assembly language programming and interfacing of 8086 it's interrupts and their applications , v. Develop ability for trouble shooting
BTEE-504	Power Electronics	<ul style="list-style-type: none"> i. Introduction to the concept of power semiconducting devices: thyristors/SCR and realize the importance of Power Electronics in electric power systems. ii. Knowledge of various types of Power Electronic Devices: rectifiers, choppers, cycloconverters and inverters iii. Knowledge of the use of power electronic devices in Power Electronic Converter systems. iv. Application in electric power systems through their VI characteristics.
BTEE-505	Numerical and Statistical Methods	<ul style="list-style-type: none"> i. Application of the knowledge of floating point numbers and non-linear equations ii. Knowledge various methods of Linear systems and eigen values applicable to electrical power systems iii. Application of differential equations, random variables to power systems

		<ul style="list-style-type: none"> iv. Understanding of special probability distribution, sampling distribution and least squares curve fittings. v. To solve complex numerical problems using various techniques.
BTEE-506	Laboratory -VII (Electrical Machines-II)	<ul style="list-style-type: none"> i. Construct equivalent circuits for single phase and three phase induction motor by routine tests. ii. Comprehend the requirement of starting and speed control methods of induction motors in the various applications of industry. iii. Construct equivalent circuits of synchronous generator and motor. iv. Apply knowledge to show utility of alternator, synchronous motors and synchronous condenser for various applications in power system. v. Construct characteristic curves for induction motors and synchronous machines. vi. Compare various methods of parallel operation of three phase alternators.
BTEE-507	Laboratory -VIII (Numerical Analysis)	<ul style="list-style-type: none"> i. Create programs in C/C++/MATLAB software for practical understanding of numerical ii. methods. iii. Evaluate various iterative techniques for finding real roots of an equation. iv. Hypothesize and validate interpolation methods. v. Design coding for solving simultaneous linear algebraic equations. vi. Analyze the techniques of numerical integration & differentiation. vii. Apply the knowledge gained for evaluating numerical & statistical problems.
BTEE-508	Laboratory -IX (Electrical: Estimation & Costing)	<ul style="list-style-type: none"> i. Understanding of the Indian electricity rules. ii. Ability to carry out energy calculations for domestic, commercial and industrial loads. iii. Ability to design power panels, earthing of equipment and small power distribution systems. iv. Analyze and generate a comparative analysis costing of at all loads.
BTEE-509	Institutional Training (Undertaken after 4 th Semester)	<ul style="list-style-type: none"> i. Link the subjects, learn hitherto with the Industry applications. ii. Understand the various management systems so that the student can become a good manager. iii. Learn various interpersonal links and multi-disciplinary tasks at industry standards. iv. Correlate the theoretical concepts with real industrial issues. v. Identify small industrial problems and try to provide simple solution.

		vi. Identify gap between customer requirement and available product.
--	--	--

COURSE CURRICULUM FOR SIXTH SEMESTER

Course Code	Course Name	Course Outcomes
BTEE-601	Electric Power Utilization	<ul style="list-style-type: none"> i. Analyze different motor applications. ii. Design various illumination systems. iii. Evaluate different heating schemes for a given application. iv. Understand process of electroplating. v. Understand technology used in refrigeration and air conditioning. vi. Understand different schemes of electric traction and its main components.
BTEE-602	Power System-II (Switch Gear & Protection)	<ul style="list-style-type: none"> i. Analyze the principle of operation of different types of relays. ii. Analyze different types of faults occur in the generator, transformers and transmission line. iii. line. iv. Demonstrate the knowledge for various components used in the relays. v. Evaluate the arc quenching mechanism used in different circuit breakers. vi. Design the relay setting for over-current and earth fault relays. vii. Create the basic knowledge of power system protection concepts.
BTEE-603	Non-Linear & Digital Control	<ul style="list-style-type: none"> i. Create the state models of different physical and electrical systems. ii. Analyze the stability of a given control system. iii. Stability and use of describing function for analysis iv. Analyze sampled data control systems by using z transformation. v. Analyze the nonlinear system behavior by phase plane and describing function methods vi. learn about the stability of linear and nonlinear systems by lyapunov method. vii. Design and analyze optimal control
BTEE-604	Microcontroller and PLC	<ul style="list-style-type: none"> i. Comprehend the importance of 8051 microcontroller and understand its internal ii. architecture. iii. Acquire programming skills in assembly and C language. iv. Acquire skill in interfacing peripherals with 8051 microcontroller. v. Create and troubleshoot the circuits involving interfacing of 8051 with real world. vi. Create and troubleshoot simple controllers employing 8051 microcontroller. vii. Evaluate the performance of 8051 controller and PLC based practical circuits.

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

BTYY-6XX	Open Elective	"Please check respective subjects given below"
BTEE-605X	Elective-I	"Please check respective subjects given below"
BTEE-606	Laboratory-X (Power Electronics & Drives)	<ul style="list-style-type: none"> i. Understand the properties and characteristics of thyristors. ii. Understand the different types of waveforms of inverter and chopper circuits iii. Analyze speed and direction control of single phase and three phase electric motors using ac and dc drive. iv. Understand the effect of free-wheeling diode on pf with RL load. v. Check the performance of a choppers, and inverter.
BTEE-607	Laboratory-XI (Power System-II)	<ul style="list-style-type: none"> i. Plot characteristics of various transmission lines ii. Understand concept of relays and circuit breakers. iii. Analyze various protection schemes in power system. iv. Plot characteristics of different types of relays. v. Measure the resistance of earth. vi. Demonstrate the operation of a circuit breaker.
BTEE-608	Laboratory-XII (Micro controller & PLC)	<ul style="list-style-type: none"> i. Comprehend the importance of 8051 microcontroller, PLC and understand their internal architecture. ii. Acquire programming, simulation and testing skills in assembly and C language. iii. Acquire skill in interfacing peripherals, relays, LED, LCD, Keyboard and sensors with 8051 microcontroller. iv. Create and troubleshoot the circuits involving interfacing of 8051 and PLC with real world. v. Create and troubleshoot automatic controllers employing 8051 microcontroller. vi. Evaluate the performance of 8051 controller and PLC based practical circuits.

Elective: Electrical Power Systems

Elective	Course Code	Course Name	Course Outcomes
Elective-I (BTEE-605X)	BTEE-605A	Computer Aided Electrical Machine Design	<ul style="list-style-type: none"> i. Understand the general concepts of electrical machine design. ii. Acquire knowledge about various insulating materials used in electrical machine design. iii. Alleviate the problems of electric machine design by using different design techniques. iv. Understand the different ways of cooling and ventilation of electric machine. v. Calculate the heat losses and efficiency in the electric machines. vi. Analyze, design, model and synthesize of Transformers and Induction motors.

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

Elective	Course Code	Course Name	Course Outcomes
	BTEE-605B	Flexible AC Transmission Systems	<ul style="list-style-type: none"> i. Retrieve the basics of Power Transmission System. ii. Understand the need and principle of operation of FACTS devices in Power System. iii. Understand the need of Series and Shunt Compensation, and phase shifter. iv. Apply FACTS devices for Power System Transmission capability enhancement. v. Design of AC and DC filters for harmonics mitigation. vi. Understand modeling and control of FACTS controllers.

Elective: Instrumentation and Control

Elective	Course Code	Course Name	Course Outcomes
Elective-I (BTEE-605X)	BTEE-605C	Instrumentation in Power System	<ul style="list-style-type: none"> i. Understand the transient response of energy meters and instrument transformers used in power systems. ii. Knowledge of how signals are digitally transmitted. iii. Understand digital telemetry methods and systems. iv. Understand the role and importance of SCADA in power systems. v. Apply knowledge of instrumentation to power systems. vi. Application of SCADA to Indian power systems.
	BTEE-605D	Biomedical Instrumentation	<ul style="list-style-type: none"> i. Thorough knowledge of various types of transducers ii. Ability to measure and interpret bioelectric signals. iii. Knowledge of equipment used for functioning support to human body. iv. Able to apply the engineering solution for prosthetics and biotelemetry. v. Interpretation in medical diagnosis and make the student aware about the same.

Elective: Electronics and Computers

Elective	Course Code	Course Name	Course Outcomes
Elective-I (BTEE-605X)	BTEE-605E	Principles of Communication Systems	<ul style="list-style-type: none"> i. Review of communication systems ii. Application of Fourier series and transforms to signals in communication systems. iii. Knowledge of radio transmitters. iv. Knowledge of radio receivers. v. Understanding of television transmitters.
	BTEE-605F	Microelectronics Technology	<ul style="list-style-type: none"> i. Knowledge of design and fabrication of ICs.

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

Elective	Course Code	Course Name	Course Outcomes
			ii. Understanding the process on silicon crystals for monolithic architecture. iii. Knowledge of processes of monolithic components iv. Understanding of large scale integration of circuits v. Basics of very large scale integrated design

OPEN ELECTIVES – offered by Electrical Engineering Department to be studied by other discipline students except Electrical Engineering and Electrical Engineering & Industrial Control students

Course Code	Course Name	Course Outcomes
BTEE-609	Fundamentals of Electrical Machines	i. To introduce the principle of operation of AC and DC machines (static/rotating type). ii. Knowledge of the concept of rotating field iii. Classification of electrical motors. iv. Knowledge of operating characteristics under changing loading conditions. v. various modern applications at domestic, industrial and commercial loads.
BTEE-610	Energy Auditing & Management	i. Understand the need, comparison and use of various type of electrical energy resources. ii. Understand and compare the basic energy audit report. iii. Comprehend various energy management standards and justify its implementation. iv. Acquire the knowledge to use various instruments for energy audit. v. Understand the environmental effects and various international protocols.
BTEE-611	Non-Conventional Energy Sources	i. Analyze the global and national energy scenario as regards to energy crisis. ii. Evaluate the economic aspects of MHD generation. iii. Analyze the available solar potential in India. iv. Evaluate the various technologies for harnessing solar energy. v. Evaluate the application of fuel cell in diverse fields. vi. Evaluate the energy harnessing from biomass, wind, geothermal, tidal and other non-conventional sources of energy.
BTEE- 612	Electrical Measurements	i. Knowledge of the basic principles of all measuring instruments. ii. Acquire knowledge of the measurement of RLC parameters, oscilloscope, iii. Understanding the various types of sensors and their applications iv. Knowledge of voltage-current, real power and reactive power, power factor, energy v. Comparison of analog-digital instruments.

COURSE CURRICULUM FOR SEVENTH/ EIGHTH SEMESTER

Course Code	Course Name	Course Outcomes
—	Industrial Training (One semester)	<ul style="list-style-type: none"> i. To link the subjects, learn hitherto with the Industry applications. ii. To understand the various management systems so that the student can become a good manager. iii. To learn various interpersonal links and multi-disciplinary tasks at industry standards.
BTEE-701	Software Training	<ul style="list-style-type: none"> i. To learn the modeling approach of real life industrial problems and analyze their outcomes for generating the remedial solutions. ii. To link the subjects learn hitherto with the software industry applications. iii. To understand the various management systems through computer software so that the student can become a good manager. iv. To learn various interpersonal links and multi-disciplinary tasks at industry standards
BTEE-702	Industrial oriented Project Training	<ul style="list-style-type: none"> i. To understand the opportunity to apply the knowledge and skills they have acquired in a real-life work situation. ii. To provide students with opportunities for practical, hands-on learning from practitioners in the students' field of study. iii. To understand the work experience while they are studying their chosen subject. iv. To expose students to the work environment, common practices, employment opportunities and work ethics in the relevant field. v. To inculcate soft skills relevant to the needs of employers. vi. To provide opportunities for students to be offered jobs in the same organizations where they undergo Industrial Training

COURSE CURRICULUM FOR SEVENTH/ EIGHTH SEMESTER

Course Code	Course Name	Course Outcomes
BTEE-801	Power System Analysis	<ul style="list-style-type: none"> i. Develop per unit system models of synchronous machine, transformer, transmission line and static loads for power system studies. ii. Construct Bus Admittance Matrix and Bus Impedance Matrix for power system studies. iii. Investigate the state of power system by performing load flow analysis. iv. Compare features of Gauss-Siedel, Newton-Raphson and Fast decoupled methods of load flow analysis.

		<ul style="list-style-type: none"> v. Analyze the effect of symmetrical and unsymmetrical faults on power system. vi. Analyze the effect of small and large disturbances on power system stability.
BTEE-802	High Voltage Engineering	<ul style="list-style-type: none"> i. Elucidate breakdown phenomenon and concept of high voltage power apparatus. ii. Understand applications of various insulating materials. iii. Design, generate and measure high voltage & current circuits. iv. Evaluate corona loss and compensation requirement in EHVAC transmission line. v. Employ concept of insulation coordination, insulating material and radio interference in power system. vi. Understand the concept of high voltage DC transmission and its merits.
BTEE-803	Non-Conventional Energy Sources	<ul style="list-style-type: none"> i. Analyze the global and national energy scenario as regards to energy crisis. ii. To explain the basic renewable energy sources like solar, wind, biomass etc. iii. Analyze the available various RES potential in India and around world. iv. To explain different technology associate with solar, wind, biomass and other renewable energy sources. v. Evaluate the application of fuel cell in diverse fields. vi. Evaluate the energy harnessing from biomass, wind, geothermal, tidal and other non-conventional sources of energy.
BTEE-804Y	Elective-II	"Please check respective subjects given below"
BTEE-805Z	Elective-III	"Please check respective subjects given below"
BTEE-806	Laboratory -VIII (Power System Analysis)	<ul style="list-style-type: none"> i. Acquire the skill of using computer packages with the help of high level programming language and software tools in power system studies. ii. Acquire the skill of using power system related tools for power system studies. iii. Develop computer program for load flow analysis. iv. Understand the procedure and steps needed to perform short circuit analysis. v. Carry out stability studies of power system. vi. Simulate load frequency control of single area system.
BTEE-807	Project Work	<ul style="list-style-type: none"> i. To acquire knowledge and experience of software and hardware practices in the area of project ii. Evaluate application of a particular tool/ component for specific application. iii. Acquire ability to apply thinking and problem-solving skills. iv. Develop habit of responsibility sharing. v. Apply knowledge gained for analysis and design of circuits.

		vi. To demonstrate the knowledge of professional responsibilities and respect for ethics.
BTEE-808	Seminar	i. Explore and analyze new areas of research related to electrical engineering ii. Evaluate the effect of newer technologies to our lives. iii. Create power point presentations. iv. Acquire ability for public speaking and giving lecture/presentation. v. Analyze various new technologies with existing technologies. vi. Evaluate the environmental effects of introducing new technologies.

Elective	Electrical Power Systems		Course Outcomes
Elective-I (BTEE-605X)	BTEE-605A	Computer Aided Electrical Machine Design	i. Understand the general concepts of electrical machine design. ii. Acquire knowledge about various insulating materials used in electrical machine design. iii. Alleviate the problems of electric machine design by using different design techniques. iv. Understand the different ways of cooling and ventilation of electric machine. v. Calculate the heat losses and efficiency in the electric machines. vi. Analyze, design, model and synthesize of Transformers and Induction motors.
	BTEE-605B	Flexible AC Transmission Systems	i. Retrieve the basics of Power Transmission System. ii. Understand the need and principle of operation of FACTS devices in Power System. iii. Understand the need of Series and Shunt Compensation. iv. Apply FACTS devices for Power System Transmission capability enhancement. v. To appraise series compensated power system behaviour with different series compensators. vi. Understand modeling and control of FACTS controllers.
Elective-II (BTEE-804Y)	BTEE-804A	Power System Operation and Control	i. Retrieve characteristic features of power generation in steam units, co-generation plants and hydro-electric units. ii. Understand economic dispatch problem. iii. Evaluate unit commitment problem and apply various solution methods. iv. Understand optimal power flow problem and find its solutions. v. Understand hydro-thermal co-ordination.

Elective-III (BTEE-805Z)	BTEE-804B	Energy Auditing and Management	<p>vi. Retrieve the techniques of automatic generation control.</p> <p>i. Understand the need, comparison and use of various type of electrical energy resources.</p> <p>ii. Understand and compare the basic energy audit report</p> <p>iii. Comprehend various energy management standards and justify its implementation</p> <p>iv. Acquire the knowledge to use various instruments for energy audit</p> <p>v. Understand the environmental effects and various international protocols</p> <p>vi. Explain and analyze the pollution situation and understand clean development mechanism.</p>
	BTEE-805A	Power Quality Monitoring and Conditioning	<p>i. Analyze Sensitivity of modern electrical load and systems to the quality of the electricity supply.</p> <p>ii. Identify types and sources of the distortion that create a poor quality of supply.</p> <p>iii. Understand the effects of electrical distortions on load and system reliability.</p> <p>iv. Explain how quality of supply is measured and categorised within national and international standards.</p> <p>v. Differentiate the difference between Power Quality and Quality of Supply.</p> <p>vi. Understand the various power quality phenomenon, their origin and monitoring and mitigation methods.</p> <p>vii. Explain how Power Quality can be improved for mission critical loads and systems.</p> <p>viii. Analyze and evaluate the characteristics of power frequency disturbances, Electrical transient effects, harmonics and power factor, grounding and bonding, and electromagnetic interferences.</p>
	BTEE-805B	HVDC Transmission	<p>i. Understand the basic concepts of EHV AC and HVDC transmission.</p> <p>ii. Identify the electrical requirements for HVDC lines.</p> <p>iii. Identify the components used in AC to DC conversion.</p> <p>iv. Understand the operation of HVDC conversion technology.</p> <p>v. Understand the fundamental requirements of HVDC transmission line design.</p> <p>vi. Identify factors affecting AC-DC transmission. HVDC Transmission systems and Idea about modern trends in HVDC Transmission and its</p>

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

			<p>application, Understand about the overvoltage and its effects on power system.</p> <p>vii. Complete analysis of harmonics and basis of protection for HVDC Systems.</p>
Elective-II (BTEE-804Y)	BTEE-804C	Digital Signal Processing	<p>i. Analyze discrete signals and systems.</p> <p>ii. Evaluate discrete Fourier transform using fast Fourier transform algorithms.</p> <p>iii. Create describing equation for digital filter structure.</p> <p>iv. Design and analyze digital filters.</p> <p>v. Design and analyze filters using pole-zero combination.</p> <p>vi. f. Design and analyze DSP processor.</p>
	BTEE-804D	Industrial Process Control	<p>i. Thorough understanding of motor-load system dynamics and stability, modern drive system objectives and fundamentals of dc and ac motors.</p> <p>ii. Adjust the set point on a pictorial representation of an industrial controller</p> <p>iii. Identify the controlled, measured, and manipulated variables of a heat exchanger system</p> <p>iv. Determine the setting of the controller's proportional band and gain on a pictorial representation of process control action</p> <p>v. identify the effects of reset wind up on the elements of process control on a heat exchange system</p> <p>vi. Evaluate and implement PID controllers in industrial applications</p> <p>vii. Identify the method of process control used in direct digital, supervisory, and distributed control systems.</p>
Elective-III (BTEE-805Z)	BTEE-805C	Virtual Instrumentation	<p>i. Background knowledge for developing a Virtual Instrumentation</p> <p>ii. Use of state-of-the-art Virtual Instrumentation tools.</p> <p>iii. To enable the student to gain experience in data acquisition and instrument control</p> <p>iv. Familiarize with block diagrams, icon, connectors panes, signal processing, analogue input and triggering.</p> <p>v. Build an engineering application, install and configure data acquisition hardware.</p>
	BTEE-805D	Energy Efficient Machines	<p>i. Comprehend the need of energy efficient machines for energy conservation.</p> <p>ii. Understand the concept of power factor and energy efficient motors.</p>

IK Gujral Punjab Technical University
Course Outcomes for B.Tech. Electrical Engineering
By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of B. Tech. Electrical Engineering [EE] Batch 2011)

			<ul style="list-style-type: none"> iii. Justify the use of motors and adjustable drive systems for various applications. iv. Calculate savings and pay back periods for energy efficient machines.
Elective	Electronics and Computers		
Elective-II (BTEE-804Y)	BTEE-804E	Networks and Data Communication	<ul style="list-style-type: none"> i. Understanding the basic concepts in data communication networking, layering concept and communication network architectures ii. Investigate the fundamental issues driving network design and learn how computer network hardware, dominant network technologies and software operate iii. Understand the Data transmission, transmission media, channel impairments, channel capacity iv. Become familiar with the digital data communications techniques; synchronous and asynchronous transmission, error detection and correction
	BTEE-804F	Data Mining and Pattern Recognition	<ul style="list-style-type: none"> i. Identify the basic and different mining analyses can be applied to text collections ii. Understanding the capabilities of modern search engine iii. Understand the pros and cons of various representation of the data iv. Use simple analysis tools.
Elective-III (BTEE-805Z)	BTEE-805E	Embedded Systems	<ul style="list-style-type: none"> i. Understand what is a microcontroller, microcomputer, embedded system. ii. Understand different components of a microcontroller and their interactions. iii. Become familiar with programming environment used to develop embedded systems iv. Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices v. Learn debugging techniques for an embedded system.
	BTEE-805F	Visual Programming	<ul style="list-style-type: none"> i. Distinguish the types of event driven programming. ii. Write program code using event driven programming iii. Emphasis on the fundamentals of structured design, development, iv. Testing, implementation, and documentation in programming. v. Use functions in visual programs

COURSE CURRICULUM FOR FIRST SEMESTER

Course Code	Course Name	Course Outcomes
PEE501	Power System Operation & Control	<ul style="list-style-type: none"> i. Analyze the difference in characteristic curves for different types of generation. ii. Understand economic dispatch problem, unit commitment problem and apply various solution methods to these problems. iii. Understand hydro-thermal co-ordination, concept of energy banking and power trading. iv. d. Retrieve the techniques of automatic generation control.
PEE502	Advanced Power System Analysis	<ul style="list-style-type: none"> i. Construct network matrices by singular and non-singular transformation and bus impedance matrices by algorithmic approach. ii. Develop mathematical model and find solution of optimal power flow problems. iii. Investigate state of a power system by power flow analysis as well as state estimation. iv. d. Investigate security of Power System using Short Circuit and Contingency Analysis.
PEE503	Advanced Power Electronics	<ul style="list-style-type: none"> i. Understand the Design Consideration of Gate and Basic drive system. ii. Understand the design of Practical Converter in Electronic circuit. iii. Understand about different types of Power supplies. iv. d. Apply Power Electronics in commercial and industrial applications.
PEE504	Digital Control System	<ul style="list-style-type: none"> i. Understand Digital Control Systems. ii. Apply knowledge to find Time Response of Digital Control Systems. iii. Analyse the stability of Digital Control Systems. iv. Create Digital Control System and analyse by using State Variable Technique.
PEE505	Advanced Electrical Machines	<ul style="list-style-type: none"> i. Construct equivalent circuit of poly phase synchronous machines. ii. Understand the parameters related to steady state analysis of cylindrical and salient pole synchronous machines. iii. Analyze multi circuit transformers for finding out the parameters and understand concept of inrush current. iv. Analyze the harmonics in waveforms
PEE506	Power System Software Lab	<ul style="list-style-type: none"> i. Construct the impedance and admittance matrices using software. ii. Understand the procedure and steps needed to implement a load flow system study and interpret the results provided by the software.

		<p>iii. Apply a short circuit analysis study for symmetrical and unsymmetrical faults and are able to interpret the results of the analysis.</p> <p>iv. Understand and able to perform transient stability analysis.</p>
--	--	--

COURSE CURRICULUM FOR SECOND SEMESTER

Course Code	Course Name	Course Outcomes
PEE508	H.V.D.C Transmission	<p>i. Compare merits of HVDC transmission over EHVAC transmission.</p> <p>ii. Comprehend the control of HVDC links and converter connections.</p> <p>iii. Understand the concept of harmonics and needs for compensation.</p> <p>iv. Analyze multi-terminal HVDC systems and protection schemes.</p>
PEE509	Power System Protection	<p>i. Apply knowledge of circuit breakers to suggest suitable breaker for a application.</p> <p>ii. Select and model various components (like CT, CVT, and numerical relay) for protection purpose.</p> <p>iii. Design and simulate over current, distance and differential protection schemes for power Systems.</p>
PEE510	Industrial Automation Lab	<p>i. Retrieve the basic knowledge of PLC.</p> <p>ii. Create simple working program on PLC.</p> <p>iii. Understand the use of PLC in process control industry.</p> <p>iv. Analyze the SCADA system and its application.</p>
PEE	Elective -I	
PEE	Elective -II	

COURSE CURRICULUM FOR THIRD SEMESTER

Course Code	Course Name	Course Outcomes
PEE	Elective-III	
PEE	Elective-IV	
PEE511	Project	<p>i. Acquire ability to work in team.</p> <p>ii. Evaluate application of a particular tool/ component for specific application.</p> <p>iii. Acquire ability to apply thinking and problem solving skills.</p> <p>iv. Apply knowledge gained for analysis and design of circuits</p>
PEE512	Seminar	<p>i. Evaluate various latest topics in power systems.</p> <p>ii. Analyze and develop a thought process for presentation.</p> <p>iii. Understand others point of view, thereby encouraging team work.</p> <p>iv. Evaluate the impact of various technologies on environment.</p>

COURSE CURRICULUM FOR FOURTH SEMESTER

Course Code	Course Name	Course Outcomes
PEE600	Dissertation	<ul style="list-style-type: none"> i. Try to find a practical problem which would be beneficial for the society growth ii. Acquire maximum literature about the problem iii. Frame objectives based on the gaps iv. Road map should be clear to achieve the target. v. Feel encouraged taking up a research problem. vi. Contact the engineering fraternity. vii. Acquire knowledge for finding solutions to problems in emerging areas. viii. Able to present their ideas in written form and feel encouraged to present technical papers.

OPEN ELECTIVES Elective- I		Course Outcomes
PEE513	Power System Stability	<ul style="list-style-type: none"> i. Develop model of power system components for stability studies. ii. Carry out transient stability analysis of a single machine infinite bus system. iii. Carry out small signal stability analysis of single machine infinite bus and multi-machine systems. iv. Understand the problems associated with sub-synchronous resonance and voltage instability and make investigations for voltage stability improvement of a power system.
PEE514	E.H.V.A.C Transmission	<ul style="list-style-type: none"> i. Analyse the electrostatic field of EHV AC transmission lines. ii. Analyse EHV AC transmission line parameters and Corona Loss. iii. Understand the Lightning Phenomenon, Lightning Protection, and FACT devices. iv. Design EHV transmission lines based on steady state limits.
PEE515	Reliability Engineering	<ul style="list-style-type: none"> i. Conceptualize probability distributions and real appreciation of reliability engineering. ii. Create models of simple engineering systems for reliability studies. iii. Evaluate of reliability indices through different methods. iv. Understand hazard models and apply methods of enhancing system reliability.

OPEN ELECTIVES Elective-II		Course Outcomes
PEE516	Microprocessor & their applications	<ul style="list-style-type: none"> i. Understand the internal architecture of 8085 and 8086 microprocessor, addressing modes and timing methods. ii. Understand peripheral interfacing of 8086.

		<ul style="list-style-type: none"> iii. Analyze interfacing of external electrical devices to the processor or according to the user requirements to create novel products and solutions for power engineering based applications. iv. Understand protective relaying and measurements using microprocessor.
PEE517	Applied Instrumentation	<ul style="list-style-type: none"> i. Classification of transducers and their static and dynamic responses. ii. Measurement of physical and electrical quantities with transducers. iii. Understand telemetry systems and methods of multiplexing. iv. Study about various types of display devices, fibre optic technology and electrical noise in control signals.
PEE518	Fast Transients in Power System	<ul style="list-style-type: none"> i. Define, classify, interpret and model the transient phenomena in power system. ii. Understand the concept of switching surges. iii. Analyze transient phenomena and develop the strategies to mitigate associated problems. iv. Evaluate the transient process due to lightning.

OPEN ELECTIVES Elective-III		Course Outcomes
PEE519	Energy Efficient Machines	<ul style="list-style-type: none"> i. Comprehend the need of energy efficient machines for energy conservation. ii. Understand the concept of power factor and energy efficient motors. iii. Justify the use of motors and adjustable drive systems for various applications. iv. Calculate savings and pay back periods for energy efficient machines.
PEE520	Advanced Electrical Drives	<ul style="list-style-type: none"> i. Model and analyze electrical motor drives. ii. Apply the theories of electrical machines, power electronic converters and control system design to implement drive systems which are appropriate for specific performances. iii. Understand the speed control and braking methods of electrical drives. iv. Demonstrate the application of DC and induction motor drives.
PEE521	Non conventional energy sources	<ul style="list-style-type: none"> i. Analyze the advantages and disadvantages of various schemes for harnessing energy from renewable sources. ii. Analyze to compare economics of harnessing power from renewable sources. iii. Analyze the solar energy prospectus in India. iv. Evaluate the energy harnessing from biomass.

OPEN ELECTIVES Elective-IV			Course Objectives
PEE522	Power Reliability	System	<ul style="list-style-type: none"> i. Retrieve basic reliability modeling. ii. Apply probability techniques to power system problems and load forecasting. iii. Understand the method of evaluation of transmission system reliability. iv. Apply reliability calculation approach to composite systems.
PEE523	Power Planning	System	<ul style="list-style-type: none"> i. Understand the objectives of national and regional planning strategies of electric power. ii. Acquire knowledge about the concept of load forecasting. iii. Apply the concept of generation, transmission and distribution planning in power system. iv. Evaluate loss of energy indices and calculate voltage and power loss.
PEE524	Power Communication	System	<ul style="list-style-type: none"> i. Communication links required through tele-systems in power system. ii. Analog and digital ways of communication with possible noise in power system. iii. Conventional and modern communication link used in power system. iv. Communication equipment and computer networking for simultaneous establishment of information of power system.
PEE525	Optimization Techniques		<ul style="list-style-type: none"> i. Classify the optimization problems and their solution methods into various categories. ii. Understand and apply analytical methods for the solution of unconstrained and constrained optimization problems with continuous variables. iii. Develop mathematical model and find optimal solutions of linear programming and transportation problems. iv. Understand and apply analytical methods for the solution of single and multi-variable unconstrained and constrained optimization problems with non-continuous variables.
PEE526	Neural Network & Fuzzy Logic		<ul style="list-style-type: none"> i. Acquire a thorough knowledge on biological neurons and artificial neurons, comparative analysis between human and computer, artificial neural network models, characteristics of ANN's. ii. Learn different types of activation functions, learning strategies, learning rules, perceptron models, single and multi-layer feed-forward and feed-back Neural Networks.

		<ul style="list-style-type: none">iii. Apply concept of classical and Fuzzy Sets, Fuzzy Logic System components fuzzification and defuzzification.iv. Apply the neural network conceptual knowledge to real-world electrical problems and applications.
--	--	--

COURSE CURRICULUM FOR FIRST SEMESTER

Course Code	Course Name	Course Outcomes
MTRM-101	Research Methodology	i. Understand the difference between various types of research. ii. Apply various statistical techniques for analysis of data. iii. Construct and analyze hypothesis through various test. iv. Learn to write the report.
MTPS 101/ EEPS-101	Power System Analysis and Design	i. Construct network matrices by singular and non-singular transformation and bus impedance matrices by algorithmic approach. ii. Develop mathematical model and find solution of optimal power flow problems. iii. Investigate state of a power system by power flow analysis as well as state estimation. iv. Investigate security of Power System using Short Circuit and Contingency Analysis.
MTPS-102/ EEPS-102	FACTS Devices & Power Transmission	i. Understand the FACTS devices used in Power transmission ii. Understand power compensation in Power system iii. Ability to design controller for reactive power compensation. iv. d. Understand the concept of control of active power through FACTS devices.
MTPS-103 / EEPS-103	Power System Quality Assessment	i. Understand the issues affecting power quality ii. Understand the measurement, monitoring of power quality. iii. Ability to apply waveform processing techniques to analyse the harmonics. iv. Ability to apply methods for mitigation of effects of harmonics.
MTPS-104 / EEPS -104	Advanced Relaying and Protection	i. Apply knowledge of circuit breakers to suggest suitable breaker for a particular application. ii. Select and model various components (like CT, CVT, and numerical relay) for protection purpose. iii. Design and simulate over current, distance and differential protection schemes for power systems. iv. Develop the advanced schemes for power system protection using modern technologies.

COURSE CURRICULUM FOR Second SEMESTER

Course Code	Course Name	Course Outcomes
MTPS-201 / EEPS -201	Power System Operation and Control	i. Analyze the difference in characteristic curves for different types of generation. ii. Understand economic dispatch problem, unit commitment problem and apply various solution methods to these problems. iii. Understand hydro-thermal co-ordination, concept of energy banking and power trading.

IK Gujral Punjab Technical University
Course Outcomes for M. Tech. Electrical Engineering (Power System)
 By
Board of Studies Electrical Engineering
(as per Scheme & Syllabus of M. Tech. Electrical Engineering (Power System) Batch 2015)

		iv. Retrieve the techniques of automatic generation control.
MTPS-202 / EEPS-202	Power System Restructuring and deregulation	i. Understanding of deregulation and restructuring of power system ii. Understands the dynamics of power trading through Open Access iii. Understand the various aspects of congestion management in power system iv. Analyze the effects of distributed generation on Power quality.
MTPS-203 / EEPS -203	Power System Dynamics and Stability	i. Understand the stability issues in power system ii. Ability to model various components of power system for carrying out various studies iii. Can perform steady state and transient stability analysis on power system iv. Analyze the impact of load, reactive power on voltage stability.
MTPS-204X/ EEPS -204X	Elective-I	
MTEE-205Y/ EEPS-205Y	Elective-II	

COURSE CURRICULUM FOR Third SEMESTER

Course Code	Course Name	Course Outcomes
MTPS-301X / EEPS-301X	Elective-III	
MTPS-302Y / EEPS-302Y	Elective-IV	
MTPS-303 / EEPS-303	Project	i. Acquire ability to work in team. ii. Evaluate application of a particular tool/ component for specific application. iii. Acquire ability to apply thinking and problem solving skills. iv. Apply knowledge gained for analysis and design of circuits.
MTPS-304 / EEPS-304	Seminar	i. Evaluate various latest topics in power systems. ii. Analyze and develop a thought process for presentation. iii. Understand others point of view, thereby encouraging team work. iv. Evaluate the impact of various technologies on environment.
MTPS-305 / EEPS-305	Dissertation (Synopsis)	i. Try to find a practical problem which would be beneficial for the society growth ii. Acquire maximum literature about the problem iii. Frame objectives based on the gaps iv. Road map should be clear to achieve the target.

COURSE CURRICULUM FOR FOURTH SEMESTER

Course Code	Course Name	Course Outcomes
MTPS-305 / EEPS305	Dissertation	i. Feel encouraged taking up a research problem. ii. Contact the engineering fraternity. iii. Acquire knowledge for finding solutions to problems in emerging areas. iv. Able to present their ideas in written form and feel encouraged to present technical papers.

Elective	Elective Electrical Engineering		Course Outcomes
Elective-I	MTPS-204A / EEPS 301A	Intelligent Techniques and Applications	i. To make the students familiar about the fundamentals in basic controlling techniques, and intelligent techniques. ii. To enable students to develop the basic model of controller of artificial intelligence. iii. To enable students to apply the developed controller for industrial motor applications. iv. To enable students to apply the developed controller for electric power and various energy applications.
	EEPS 205A	Intellectual Property Rights	i. Understands the intricacies of IPR and patents ii. Understanding of various rules and regulations governing IPRs and Patents iii. Understands product trademarks and Geographical Indicators iv. Understanding of trade secrets .
	MTPS-204B / EEPS 204A	Industrial Drives and Automation	i. Model and analyse electrical motor drives and machines ii. Understand the speed control and braking methods of electrical drives. iii. Retrieve the basic knowledge of Automation. iv. Analyse the automation systems and its application.
	MTPS-204C / EEPS 301E	Renewable Energy Resources	i. Analyse the advantages and disadvantages of various schemes for harnessing energy from renewable sources. ii. Analyse to compare economics of harnessing power from renewable sources. iii. Analyse the solar energy prospectus in India. iv. Evaluate the energy harnessing from biomass.
	MTPS-204D / EEPS 302A	High Voltage Engineering and Test Techniques	i. Understand the concept of High voltage Engineering ii. Understand how to bear lightening and switching over voltages. iii. Clarify the need of Insulation at various levels. iv. Able to undertake High voltage tests during industry oriented applications.

Elective-II	MTPS-205A	Advanced Power Electronics	i. Understand the Design Consideration of Gate and Basic drive system. ii. Understand the design of Practical Converter in Electronic circuit. iii. Understand about different types of Power supplies. iv. Apply Power Electronics in commercial and industrial applications.
	EEPS 204C	Distribution Automation	i. Understands application of automation in distribution system ii. Ability to design hardware necessary for automation iii. Ability to evaluate cost benefit analysis iv. Ability to assess the requirements of DA for communication
	EEPS 205E	Modern Control Theory	i. Understand Modern control Systems. ii. Apply knowledge to find State Variable of physical systems iii. Perform the stability analysis of linear, nonlinear system. iv. Apply knowledge to optimize control of the system.
	MTPS-205B / EEPS 204E	Microprocessor and Microcontroller	i. Understand the internal architecture of microprocessor and Microcontrollers along with addressing modes and timing methods. ii. Understand peripheral interfacing . iii. Analyze interfacing of external electrical devices to the processor or according to the user requirements to create novel products and solutions for power engineering based applications. iv. Understand protective relaying and measurements using microprocessor and microcontroller.
	MTPS-205C / EEPS 204D	Real Time Instrumentation	i. Apply the knowledge of transducers/Sensors for suggesting various applications and analyze the role of process control in estimation of errors and calibrations. ii. Evaluate the use of transducer for measurement of various non-electrical quantities and design Signal Conditioning circuits. iii. To understand the Data acquisition for energy management systems. iv. Create the process control techniques for industrial processes keeping into account Real Time analysis.

	MTPS-205D / EEPS 301B	Optimization Techniques	i. Classify the optimization problems and their solution methods into various categories. ii. Understand and apply analytical methods for the solution of unconstrained and constrained optimization problems with continuous variables. iii. Develop mathematical model and find optimal solutions of linear programming and transportation problems. iv. Understand and apply analytical methods for the solution of single and multi-variable unconstrained and constrained optimization problems with non-continuous variables.
Elective-III	MTPS-301A / EEPS 302B	Energy Efficient Machines	i. Comprehend the need of energy efficient machines for energy conservation. ii. Understand the concept of power factor and energy efficient motors. iii. Justify the use of motors and adjustable drive systems for various applications. iv. Calculate savings and pay back periods for energy efficient machines.
	MTPS-301B / EEPS 302C	Modelling and Dynamics of Electrical Machines	i. Understand the importance and issues related to Modelling of electric machines. ii. Apply his/her knowledge for developing models of electrical machines iii. Ability to perform transient analysis on developed model. iv. Understand the dynamics of electrical machines under normal/abnormal conditions in power system.
	EEPS 301C	Electric Smart Grid	i. Understands concept of smart grid ii. Apply knowledge to derive benefits from the application of smart grids iii. Understand the distributed energy resources and consumer demand iv. Apply knowledge to manage energy resources in optimized way.
	MTPS-301C / EEPS 301D	EHVAC and HVDC Transmission System	i. Define, classify, interpret and model the transient phenomena in EHVAC and HVDC ii. Understand the concept of VAR system in switching surges. iii. Analyze transient & Interference develop in HVDC and the strategies to mitigate associated problems using Harmonic filters. iv. Evaluate the transient process due to lightning during Power flow analysis in AC/DC Systems.
	MTPS-301D / EEPS 302D	Power System Transients	i. Define, classify, interpret and model the transient phenomena in power system.

			<ul style="list-style-type: none"> ii. Understand the concept of switching surges. iii. Analyze transient phenomena and develop the strategies to mitigate associated problems. iv. Evaluate the transient process due to lightning .
Elective-IV	MTPS-302A / EEPS 302E	Power System Reliability	<ul style="list-style-type: none"> i. Retrieve basic reliability modelling. ii. Apply probability techniques to power system problems and load forecasting. iii. Understand the method of evaluation of transmission system reliability. iv. Apply reliability calculation approach to composite systems.
	MTPS-302B / EEPS 205C	Power System Planning	<ul style="list-style-type: none"> i. Understand the objectives of national and regional planning strategies of electric power. ii. Acquire knowledge about the concept of load forecasting. iii. Apply the concept of generation, transmission and distribution planning in power system. iv. Evaluate loss of energy indices and calculate voltage and power loss.
	MTPS-302C / EEPS 205D	Load and Energy Management	<ul style="list-style-type: none"> i. Understand the need of Management Process for Power Utility. ii. Apply Load Forecasting during construction in power sector. iii. Understand the Load Management during evaluation of Investment Proposal in Power sector. iv. Understand the different structure of a Utility Organization using Case studies.
	MTPS-302D / EEPS 205B	Organization and Finance in Power Sector	<ul style="list-style-type: none"> i. Understand the role of management in power sector ii. Apply Financial utilities and analysis for better load management iii. Understand actual cost involved at different parts iv. Clarify industry status and trends during complete structure of power system.

COURSE CURRICULUM FOR FIRST SEMESTER

Course Code	Course Name	Course Outcomes
MTRM-101	Research Methodology	i. Understand the difference between various types of research. ii. Apply various statistical techniques for analysis of data. iii. Construct and analyze hypothesis through various test. iv. Learn to write the report.
MTEE-101	Power System Analysis and Design	i. Construct network matrices by singular and non-singular transformation and bus impedance matrices by algorithmic approach. ii. Develop mathematical model and find solution of optimal power flow problems. iii. Investigate state of a power system by power flow analysis as well as state estimation. iv. Investigate security of Power System using Short Circuit and Contingency Analysis.
MTEE-102	Advanced Power Electronics	i. Understand the Design Consideration of Gate and Basic drive system. ii. Understand the design of Practical Converter in Electronic circuit. iii. Understand about different types of Power supplies. iv. Apply Power Electronics in commercial and industrial applications.
MTEE-103	Advanced Electrical Machines	i. Construct equivalent circuit of poly phase synchronous machines. ii. Understand the parameters related to steady state analysis of cylindrical and salient pole synchronous machines. iii. Analyze multi circuit transformers for finding out the parameters and understand concept of in rush current. iv. Analyze the harmonics in waveforms.
MTEE-104	Digital Control System	i. Understand Digital Control Systems. ii. Apply knowledge to find Time Response of Digital Control Systems. iii. Analyse the stability of Digital Control Systems. iv. Create Digital Control System and analyse by using State Variable Technique.

COURSE CURRICULUM FOR SECOND SEMESTER

Course Code	Course Name	Course Outcomes
MTEE-201	Power System Operation and Control	i. Analyze the difference in characteristic curves for different types of generation.

		<ul style="list-style-type: none"> ii. Understand economic dispatch problem, unit commitment problem and apply various solution methods to these problems. iii. Understand hydro-thermal co-ordination, concept of energy banking and power trading. iv. Retrieve the techniques of automatic generation control.
MTEE-202	Advanced Relaying and Protection	<ul style="list-style-type: none"> i. Apply knowledge of circuit breakers to suggest suitable breaker for a particular application. ii. Select and model various components (like CT, CVT, and numerical relay) for protection purpose. iii. Design and simulate over current, distance and differential protection schemes for power Systems. iv. Develop the advanced schemes for power system protection using new technologies.
MTEE-203	Modeling and Dynamics of Electrical Machines	<ul style="list-style-type: none"> i. Develop model of power system components for stability studies. ii. Carry out transient stability analysis of a single machine infinite bus system. iii. Carry out small signal stability analysis of single machine infinite bus and multi-machine systems. iv. Understand the problems associated with sub-synchronous resonance and voltage instability and make investigations for voltage stability improvement of a power system.
MTEE-204X	Elective-I	
MTEE-205Y	Elective-II	

COURSE CURRICULUM FOR THIRD SEMESTER

Course Code	Course Name	Course Outcomes
MTEE-301X	Elective-III	
MTEE-302Y	Elective-IV	
MTEE-303	Project	<ul style="list-style-type: none"> i. Acquire ability to work in team. ii. Evaluate application of a particular tool/ component for specific application. iii. Acquire ability to apply thinking and problem-solving skills. iv. Apply knowledge gained for analysis and design of circuits.
MTEE-304	Seminar	<ul style="list-style-type: none"> i. Evaluate various latest topics in power systems. ii. Analyze and develop a thought process for presentation. iii. Understand others point of view, thereby encouraging team work. iv. Evaluate the impact of various technologies on environment.

MTEE-305	Dissertation (Synopsis)	<ul style="list-style-type: none"> i. Try to find a practical problem which would be beneficial for the society growth ii. Acquire maximum literature about the problem iii. Frame objectives based on the gaps iv. Road map should be clear to achieve the target.
----------	-------------------------	---

COURSE CURRICULUM FOR FOURTH SEMESTER

Course Code	Course Name	Course Outcomes
MTEE-305	Dissertation	<ul style="list-style-type: none"> i. Feel encouraged taking up a research problem. ii. Contact the engineering fraternity. iii. Acquire knowledge for finding solutions to problems in emerging areas. iv. Able to present their ideas in written form and feel encouraged to present technical papers.

Elective Electrical Engineering

Elective	Course Code	Course Name	Course Outcomes
Elective-I	MTEE-204A	Intelligent Techniques and Applications	<ul style="list-style-type: none"> i. To make the students familiar about the fundamentals in basic controlling techniques, and intelligent techniques. ii. To enable students to develop the basic model of controller of artificial intelligence. iii. To enable students to apply the developed controller for industrial motor applications. iv. 4. To enable students to apply the developed controller for electric power and various energy applications.
	MTEE-204B	Industrial Drives and Automation	<ul style="list-style-type: none"> i. Model and analyse electrical motor drives and machines ii. Understand the speed control and braking methods of electrical drives. iii. Retrieve the basic knowledge of Automation. iv. Analyse the automation systems and its application.
	MTEE-204C	Renewable Energy Resources	<ul style="list-style-type: none"> i. Analyse the advantages and disadvantages of various schemes for harnessing energy from renewable sources. ii. Analyse to compare economics of harnessing power from renewable sources. iii. Analyse the solar energy prospectus in India. iv. Evaluate the energy harnessing from biomass.
	MTEE-204D	High Voltage Engineering and Test Techniques	<ul style="list-style-type: none"> i. Understand the concept of High Voltage Engineering. ii. How to bear lightening and switching over voltages. iii. Clarifies need of Insulation at various levels. iv. Able to undergo High voltage tests during industry oriented applications.

Elective-II	MTEE-205A	Special Electric Machines	<ul style="list-style-type: none"> i. To analyze various design aspects of special Electrical Machines. ii. To acquire constructional details of all main components for various applications. iii. Understand the concept of Advanced motors and drives. iv. Able to undergo energy efficient mechanism for industry aspects.
	MTEE-205B	Microprocessor and Microcontroller	<ul style="list-style-type: none"> i. Understand the internal architecture of microprocessor and Microcontrollers along with addressing modes and timing methods. ii. Understand peripheral interfacing. iii. Analyze interfacing of external electrical devices to the processor or according to the user requirements to create novel products and solutions for power engineering based applications. iv. Understand protective relaying and measurements using microprocessor and microcontroller.
	MTEE-205C	Real Time Instrumentation	<ul style="list-style-type: none"> i. Apply the knowledge of transducers/Sensors for suggesting various applications and analyze the role of process control in estimation of errors and calibrations. ii. Evaluate the use of transducer for measurement of various non-electrical quantities and design Signal Conditioning circuits. iii. To understand the Data acquisition for energy management systems. iv. d. Create the process control techniques for industrial processes keeping into account Real Time analysis.
	MTEE-205D	Optimization Techniques	<ul style="list-style-type: none"> i. Classify the optimization problems and their solution methods into various categories. ii. Understand and apply analytical methods for the solution of unconstrained and constrained optimization problems with continuous variables. iii. Develop mathematical model and find optimal solutions of linear programming and transportation problems. iv. d. Understand and apply analytical methods for the solution of single and multi-variable unconstrained and constrained optimization problems with non-continuous variables.
Elective-III	MTEE-301A	Energy Efficient Machines	<ul style="list-style-type: none"> i. Comprehend the need of energy efficient machines for energy conservation. ii. Understand the concept of power factor and energy efficient motors. iii. Justify the use of motors and adjustable drive systems for various applications.

			iv. d. Calculate savings and pay back periods for energy efficient machines.
	MTEE-301B Dynamics and Stability	Power System	<ul style="list-style-type: none"> i. Understand the objectives of national and regional planning strategies of electric power. ii. Acquire knowledge about the concept of load forecasting. iii. Apply the concept of generation, transmission and distribution planning in power system. iv. d. Evaluate loss of energy indices and calculate voltage and power loss.
	MTEE-301C	EHVAC and HVDC Transmission System	<ul style="list-style-type: none"> i. Define, classify, interpret and model the transient phenomena in EHVAC and HVDC ii. Understand the concept of VAR system in switching surges. iii. Analyze transient & Interference develop in HVDC and the strategies to mitigate associated problems using Harmonic filters iv. Evaluate the transient process due to lightning during Power flow analysis in AC/DC Systems.
	MTEE-301D	Power System Transients	<ul style="list-style-type: none"> i. Define, classify, interpret and model the transient phenomena in power system. ii. Understand the concept of switching surges. iii. Analyze transient phenomena and develop the strategies to mitigate associated iv. problems. v. Evaluate the transient process due to lightning.
Elective-IV	MTEE-302A	Power System Reliability	<ul style="list-style-type: none"> i. Retrieve basic reliability modelling. ii. Apply probability techniques to power system problems and load forecasting. iii. Understand the method of evaluation of transmission system reliability. iv. Apply reliability calculation approach to composite systems.
	MTEE-302B	Power System Planning	<ul style="list-style-type: none"> i. Understand the objectives of national and regional planning strategies of electric power. ii. Acquire knowledge about the concept of load forecasting. iii. Apply the concept of generation, transmission and distribution planning in power system. iv. Evaluate loss of energy indices and calculate voltage and power loss.
	MTEE-302C	Load and Energy Management	<ul style="list-style-type: none"> i. Understand the need of Management Process for Power Utility. ii. Apply Load Forecasting during construction in power sector. iii. Understand the Load Management during evaluation of Investment Proposal in Power sector. iv. d. Understand the different structure of a Utility Organization using Case studies.

	MTEE-302D	Organization and Finance in Power Sector	<ul style="list-style-type: none">i. Understand the role of management in power sectorii. Apply Financial utilities and analysis for better load managementiii. To understand actual cost involved at different partsiv. Clarify industry status and trends during complete structure of power system.
--	-----------	--	---