

Department of Electrical Engineering
IKGPTU Main Campus Kapurthala

Key Indicator – 1.1 Curriculum Design and Development

<p>1.1.3 Q_nM</p>	<p><i>Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the University</i></p> <p>1.1.3.1 : Number of courses having focus on employability/ entrepreneurship/ skill development during the year</p> <p>B Tech. EE mapping: 67 courses M Tech. EE (PSRE): 20 courses PhD: 5 courses</p> <p>Average percentage of courses having focus on employability/ entrepreneurship is 100%</p>
---	--



Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala-144006

1.1.3 Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year (2021-22)				
1.2.1 Number of new courses introduced of the total number of courses offered during the year (2021-22)				
Name of the Course	Course Code	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development	Link to the relevant document
Computer Aided Power System Analysis	PSRE-101/21	2021	Mid-semester tests, Assignments, End-semester examination	
Distributed Generation	PSRE-102/21	2021	Mid-semester tests, Assignments, End-semester examination	
FACTS and custom Power Devices	PSRE-103A/21	2021	Mid-semester tests, Assignments, End-semester examination	
Advanced Power System Protection	PSRE-103B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Mathematical Methods for Power Engineering	PSRE-103C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Analysis of Power Converter	PSRE-103D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Solar PV Energy System	PSRE-104A/21	2021	Mid-semester tests, Assignments, End-semester examination	
Waste to Energy Conversion Technologies	PSRE-104B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Small Hydro and Non-Conventional Technologies	PSRE-104C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Solar Energy Conversion Technologies	PSRE-104D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Computer Aided Power System Analysis Lab	PSRE-105/21	2021	Lab work and experiments, End-semester examination	
Power Simulation Lab-I	PSRE-106/21	2021	Lab work and experiments, End-semester examination	
English for Research Paper Writing	MTA-101/21	2021	Mid-semester tests, Assignments, End-semester examination	
Disaster Management	MTA-102/21	2021	Mid-semester tests, Assignments, End-semester examination	
Sanskrit for Technical Knowledge	MTA-103//21	2021	Mid-semester tests, Assignments, End-semester examination	
Value Education	MTA-104/21	2021	Mid-semester tests, Assignments, End-semester examination	
Research Methodology and IPR	MTRM-101/21	2021	Mid-semester tests, Assignments, End-semester examination	
Mini Project with Seminar	MTPR-101/21	2021	Mid-semester tests, Assignments, End-semester examination	
Energy Forecasting and Modeling	PSRE-201/21	2021	Mid-semester tests, Assignments, End-semester examination	
Power System Generation Control	PSRE-202/21	2021	Mid-semester tests, Assignments, End-semester examination	
Power Quality and and Harmonic Analysis	PSRE-203A/21	2021	Mid-semester tests, Assignments, End-semester examination	
Power System Dynamics	PSRE-203B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Reliability Analysis and Protection	PSRE-203C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Energy Economics and Policies	PSRE-203D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Electric and Hybrid Vehicles	PSRE-204A/21	2021	Mid-semester tests, Assignments, End-semester examination	
Smart Grids	PSRE-204B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Engineering Optimization	PSRE-204C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Artificial Intelligence Techniques	PSRE-204D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Constitution of India	MTA-105/21	2021	Mid-semester tests, Assignments, End-semester examination	
Pedagogy Studies	MTA-106/21	2021	Mid-semester tests, Assignments, End-semester examination	
Stress Management of Yoga	MTA-107/21	2021	Mid-semester tests, Assignments, End-semester examination	
Personality Development through Life Enlightenment Skills	MTA-108/21	2021	Mid-semester tests, Assignments, End-semester examination	
Industrial Load Modelling and Control	PSRE-301A/21	2021	Mid-semester tests, Assignments, End-semester examination	


Power System Deregulation	PSRE-301B/21	2021	Mid-semester tests, Assignments, End-semester examination
Solar PV Energy System	PSRE-301C/21	2021	Mid-semester tests, Assignments, End-semester examination
Energy Storage System	PSRE-301D/21	2021	Mid-semester tests, Assignments, End-semester examination
Business Analysis	MTOE-301A/21	2021	Mid-semester tests, Assignments, End-semester examination
Industrial Safety	MTOE-301B/21	2021	Mid-semester tests, Assignments, End-semester examination
Operations Research	MTOE-301C/21	2021	Mid-semester tests, Assignments, End-semester examination
Cost Management of Engineering Projects	MTOE-301D/21	2021	Mid-semester tests, Assignments, End-semester examination
Composite Materials	MTOE-301E/21	2021	Mid-semester tests, Assignments, End-semester examination
Phase-I Dissertation	PSRE-302/21	2021	Project assigned, writing and presentation of work
Phase-II Dissertation	PSRE-401/21	2021	Project assigned, writing and presentation of work
Chemistry	BTCH101-18	2018	Mid-semester tests, Assignments, End-semester examination
Chemistry (Lab)	BTCH102-18,	2018	Mid-semester tests, Assignments, End-semester examination
Maths-2	BTAMXX-18,	2018	Mid-semester tests, Assignments, End-semester examination
Prog. For Problem Solving	BTPS101-18	2018	Mid-semester tests, Assignments, End-semester examination
Prog. For Problem Solving (Lab)	BTPS102-18	2018	Mid-semester tests, Assignments, End-semester examination
Workshop & Manufacturing Practice	BTMP101-18	2018	Mid-semester tests, Assignments, End-semester examination
English	BTHU101-18	2018	Mid-semester tests, Assignments, End-semester examination
English Lab	BTHU102-18	2018	Mid-semester tests, Assignments, End-semester examination
Mentoring and professional Development	BMPD201-18	2018	Mid-semester tests, Assignments, End-semester examination
Physics {PHY (L) }	BTPHXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Physics Lab {PHY (P)} [PHYLAB-1]	BTPHXX-18	2018	Lab work and experiments, End-semester examination
Maths-I {MATHS (L)}	BTAMXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Basic Electrical Engineering {BEE (L)}	BTEE101-18	2018	Mid-semester tests, Assignments, End-semester examination
Basic Electrical Engineering Lab {BEE (P)} [BEE LAB-1]	BTEE102-19	2018	Lab work and experiments, End-semester examination
Engineering Graphics and Design (EGD) (DH-2)	BTME101-21	2018	Mid-semester tests, Assignments, End-semester examination
Mentoring and Professional Development (BMPD)	BMPD101-18	2018	Mid-semester tests, Assignments, End-semester examination
Electrical Circuit Analysis	BTEE-301-18	2018	Mid-semester tests, Assignments, End-semester examination
Analog Electronics	BTEE-302-18	2018	Mid-semester tests, Assignments, End-semester examination
Electrical Machines – I	BTEE-303-18	2018	Mid-semester tests, Assignments, End-semester examination
Electromagnetic Fields	BTEE-304-18	2018	Mid-semester tests, Assignments, End-semester examination
Engineering Mechanics	BTEE-305-18	2018	Mid-semester tests, Assignments, End-semester examination
Analog Electronics Laboratory	BTEE-311-18	2018	Lab work and experiments, End-semester examination
Electrical Machines – I Laboratory	BTEE-312-18	2018	Lab work and experiments, End-semester examination
Mandatory Course (BTMC-101-18 or BTMC 102-18)	BTMC-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Mentoring and Professional Development of Students	BMPD-301-18	2018	Mid-semester tests, Assignments, End-semester examination
Indian Constitution	BTMC-101-18	2018	Mid-semester tests, Assignments, End-semester examination
Digital Electronics	BTEE-401-18	2018	Mid-semester tests, Assignments, End-semester examination
Electrical Machines – II	BTEE-402-18	2018	Mid-semester tests, Assignments, End-semester examination
Power Electronics	BTEE-403-18	2018	Mid-semester tests, Assignments, End-semester examination

Signals and Systems	BTEE- 404-18	2018	Mid-semester tests, Assignments, End-semester examination
Mathematics-III (Probability & Statistics)	BTAM-302-18	2018	Mid-semester tests, Assignments, End-semester examination
Measurements and Instrumentation Lab.	BTEE- 41-18	2018	Lab work and experiments, End-semester examination
Digital Electronics Laboratory	BTEE- 412-18	2018	Lab work and experiments, End-semester examination
Electrical Machines – II Laboratory	BTEE- 413-18	2018	Lab work and experiments, End-semester examination
Power Electronics Laboratory	BTEE- 414-18	2018	Lab work and experiments, End-semester examination
Mandatory Course (BTMC-101-18 or BTMC 102-18)	BTMC-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Mentoring and Professional Development of Students	BMPD-401-18	2018	Mid-semester tests, Assignments, End-semester examination
Essence of Indian Traditional Knowledge	BTMC-102-18	2018	Mid-semester tests, Assignments, End-semester examination
Power Systems – I	BTEE- 501-18	2018	Mid-semester tests, Assignments, End-semester examination
Microprocessors	BTEE- 503-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-1	BTEE- 601X-18	2018	Mid-semester tests, Assignments, End-semester examination
Environmental Studies	EVS-101-18	2018	Mid-semester tests, Assignments, End-semester examination
Power Systems-I Laboratory	BTEE- 511-18	2018	Lab work and experiments, End-semester examination
Control Systems Laboratory	BTEE- 512-18	2018	Lab work and experiments, End-semester examination
Microprocessors Laboratory	BTEE- 513-18	2018	Lab work and experiments, End-semester examination
Mentoring and Professional Development of Students	BMPD-501-18	2018	Mid-semester tests, Assignments, End-semester examination
Environmental Studies	EVS 101-18	2018	Mid-semester tests, Assignments, End-semester examination
Control Systems	BTEE- 501-18	2018	Mid-semester tests, Assignments, End-semester examination
Power System-II (Operation and Control)	BTEE- 601-18	2018	Mid-semester tests, Assignments, End-semester examination
Power Generation and Economics	BTEE- 602-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-2	BTEE- 603X-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-3	BTEE- 604-18	2018	Mid-semester tests, Assignments, End-semester examination
Open Elective-1	OXX-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Humanities & Social Sciences including Mgt.	HSMC-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Electronic Design Laboratory	BTEE- 611-18	2018	Lab work and experiments, End-semester examination
Power Systems-II Laboratory	BTEE-612-18	2018	Lab work and experiments, End-semester examination
Project-1	BTEE-621-18	2018	Project assigned, writing and presentation of work
Mentoring and Professional Development of Students	BMPD-601-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-4	BTEE- 701X-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-5	BTEE- 702X-18	2018	Mid-semester tests, Assignments, End-semester examination
Programme Elective-6	BTOE- 703X-18	2018	Mid-semester tests, Assignments, End-semester examination
Open Elective-2	OXX-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Open Elective-3	OXX-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Humanities & Social Sciences including Mgt.	HSMC-XXX-18	2018	Mid-semester tests, Assignments, End-semester examination
Project-2	BTEE- 721-18	2018	Project assigned, writing and presentation of work
Mentoring and Professional Development of Students	BMPD-701-18	2018	Mid-semester tests, Assignments, End-semester examination
One Semester Training	BTEE-721-18	2018	Mid-semester tests, Assignments, End-semester examination

Name of Department: Electrical Engineering

Draft of Mapping of M. Tech. Electrical Engineering (Power Systems and Renewable Energy)

MAPPING POS AND COS


Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University,
Kaourthala-144006



Name of Department: Electrical Engineering

Program: B.Tech Electrical Engineering

Paper: BTPH102-18 Optics and Modern Physics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Identify and illustrate physical concepts and terms													Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand optical phenomenon, such as, interference, diffraction etc. in terms of wave model.													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the importance of wave equation													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Appreciate the need for quantum mechanics, wave particle duality, uncertainty principle etc. and their applications													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Understand some of the basic concepts in													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTPH112-18 Optics and Modern Physics Lab

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Verify some of the theoretical concepts in lab													Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Trained in carrying out precise measurements													Train	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Introduced to the methods used for estimation													Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Learn to draw conclusions from data and graphs													Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Write a technical report which communicates													Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTAM101-18 Mathematics-I (Calculus & Linear Algebra)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: The differential and integral calculus for applications													Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: The fallouts of Rolle's Theorem that is fundamental													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: The tool of matrices and convergence of sequences													Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: The tools of differentiation and integration of													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-101-18 Basic Electrical Engineering

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Have the knowledge of DC circuits, AC Circuits													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Be able to analyze of DC circuits, AC Circuits													Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the basic magnetic circuits and applications													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Be introduced to types of wiring, batteries, and safety													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-102-18 Basic Electrical Engineering Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: The ability to use common electrical measuring instruments and understand the fundamentals of electrical engineering.													Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: The ability to make electrical connections, and applications													Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Have the knowledge of electrical machines, control													Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Understand the operation of transformers and safety													Understand	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTME101-18 Engineering Graphics & Design (Theory & Lab.)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To prepare you to design a system, component													Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: To prepare you to communicate effectively													Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: To prepare you to use the techniques, skills, and													Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTCH101-18 Chemistry-I (Theory)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Analyze microscopic chemistry in terms of atoms													Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Rationalise bulk properties and processes using													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Distinguish the ranges of the electromagnetic													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Rationalise periodic properties such as ionization													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: List major chemical reactions that are used in													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTCH102-18 Chemistry-I (Lab.)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Estimate rate constants of reactions from concentration													Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Measure molecular/system properties such as													Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Synthesize a small drug molecule and apply													Ability	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTPS101-18 Programming for Problem Solving (Theory)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To formulate simple algorithms for arithmetic													Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To translate the algorithms to programs in C++													Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To test and execute the programs and correct													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To implement conditional branching, iteration													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: To decompose a problem into functions and sub													Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO6: To use arrays, pointers and structures to form													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO7: To apply programming to solve matrix addition													Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University

144906

CO1: Understand the concepts of rigid bodies.		V	V												Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse the free-body diagrams of different...		V	V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyse torsional motion and bending moment.		V	V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-311-18 Analog Electronics Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the use and importance of various V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Ability to make circuits on bread-board.		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Analyse, take measurements to understand ch		V	V	V	V	V	V	V	V	V	V	V	V	Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Troubleshoot, design and create electronic cir V		V	V	V	V	V	V	V	V	V	V	V	V	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Evaluate the performance electronic circuits a V		V	V	V	V	V	V	V	V	V	V	V	V	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-312-18 Electrical Machines - I Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Analyze three-phase transformer/system con		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Evaluation of equivalent circuit parameters, et		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Analyze parallel operation of transformers.		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Analyze performance characteristics of DC gen		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-401-18 Digital Electronics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand working of logic families and logic V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Design and implement Combinational and Ser V		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the process of Analog to Digital co		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Be able to understand memories.		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-402-18 Electrical Machines - II

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the concepts of rotating magnetic		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the operation of AC machines.		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyse performance characteristics of AC ma V		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To understand the difference between the syn		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-403-18 Power Electronics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the differences between signal lo		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse controlled rectifier circuits.		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyse the operation of DC-DC choppers.		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Analyse the operation of voltage source invert		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-404-18 Signals and Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the concepts of continuous time a V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse systems in complex frequency domain		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand sampling theorem and its implicat V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand mathematical tools to be able to V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTAM302-18 Mathematics-III (Probability and Statistics)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Have basics knowledge about measure of cent. V		V	V	V	V	V	V	V	V	V	V	V	V	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Familiarize the student with expectations of di V		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Familiarize probability techniques and random V		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Have basic idea about statistics including corre V		V	V	V	V	V	V	V	V	V	V	V	V	Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: To fit the given data into curves by various met V		V	V	V	V	V	V	V	V	V	V	V	V	Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-411-18 Measurements and Instrumentation Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Design and validate DC and AC bridges.		V	V	V	V	V	V	V	V	V	V	V	V	Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Analyse the dynamic response and the calibra		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Learn about various measurement devices, th V		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Understand statistical data analysis.		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Understand computerized data acquisition.		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-412-18 Digital Electronics Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To understand of basic electronic components		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Understanding verify truth tables of TTL gates		V	V	V	V	V	V	V	V	V	V	V	V	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Design and fabrication and realization of all ga		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Design the truth tables and basic circuits		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Testing of basic electronics circuits		V	V	V	V	V	V	V	V	V	V	V	V	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-413-18 Electrical Machines-II Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SBIE	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Construct equivalent circuits induction motom		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Comprehend the requirement of starting and s		V	V	V	V	V	V	V	V	V	V	V	V	Learn	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Construct equivalent circuits of synchronous s		V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
		V	V	V	V	V	V	V	V	V	V	V	V	Apply	Yes	Experiments, Viva-Voce, End Semester Exams

Head
Department of Electrical Engineering
K. Gujral Punjab Technical University
Kapurthala-141002

CO5: Construct characteristic curves for induction motor	V	V	V	V	V	V	V	V	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO6: Understand the concept of parallel operation	V	V							Understand	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-414-18 Power Electronics Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the properties and characteristics	V	V	V	V										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Understand the different types of waveforms	V	V	V	V										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Analyze speed and direction control of single phase motor			V	V			V	V	V	V				Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Understand the effect of free-wheeling diode			V	V										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Check the performance of a choppers, and invert										V	V			Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTMC-101-18 Indian Constitution

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the different dimensions of Indian Constitution			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: They will be aware about their duties towards the nation	V	V												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Students will be able to challenges of the democratic system			V	V										Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTMC-102-18 Essence of Indian Traditional Knowledge

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Ability to understand connect up and explain basic electrical circuits			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Ability to understand connects up and explain advanced electrical circuits			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-501-18 Power Systems-I (Apparatus and Modelling)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the concepts of power systems.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the various power system components			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Evaluate fault currents for different types of fault	V	V	V	V		V	V	V	V	V				Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the generation of over-voltages and under-voltages			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Understand basic protection schemes.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO6: Understand concepts of HVDC power transmission			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-502-18 Control Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the modelling of linear-time-invariant systems	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the concept of stability and its assessment for linear-time-invariant systems. Design simple feedback controllers.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-503-18 Microprocessors

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Study of 8085 and 8086 Microprocessors.	V	V												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Do assembly language programming.			V	V	V	V	V	V	V	V				Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Do Inter-facing design of peripherals like 8255, 8279, 8251, 8277.			V	V	V	V	V	V	V	V				Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Develop systems using different microprocessors.			V	V	V	V	V	V	V	V				Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-504A-18 Electrical Engineering Materials

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To Understand the basic concepts of materials.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To use simplified materials selection concepts.	V	V	V	V										Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To Understand the properties of Materials.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-504B-18 Switchgear and Protection

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand power system protection.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the main components used in power system protection.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the bus bars, overhead and underground lines.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the earthing protection.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-504C-18 Electrical Machine Design

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the construction and performance of electrical machines.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the various factors which influence the performance of electrical machines.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the principles of electrical machine design.	V	V	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Use software tools to do design calculations.			V	V										Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-504D-18 Renewable Energy Sources

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To Understand the Need, Importance and scope of Renewable Energy Sources.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To understand role significance of solar energy.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To provide importance of Wind Energy.	V	V	V	V	V	V	V	V	V	V	V	V	V	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To understand the role of ocean energy in the world.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: To get the utilization of Biogas plants and geothermal energy.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO6: To understand the concept of energy conservation.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EVS-101-18 Environmental Studies

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
----------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	-------	-------	--

Head
 Department of Electrical Engineering
 I.K. Gujral Punjab Technical University
 Kapurthala-141001
 Kaunthala-141001

CO1:Students will enable to understand environment						v	v												Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:The students will gain practical knowledge by	v		v																Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:The students will apply interdisciplinary approach																			Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Reflect critically about their roles and identities														v	v	v			Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-511-18 Power Systems – I Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-512-18 Control Systems Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-513-18 Microprocessors Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course			v	v	v	v	v	v	v	v	v	v	Analyze	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-521-18 Summer Industry Internship

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:exposure to the practical aspects of the discipline	v	v	v	v	v	v	v	v	v	v	v	v	Ability	Yes Hands on Practice, Viva-Voce, End Semester Exams
CO2:work on a specified task	v	v	v	v	v	v	v	v	v	v	v	v	Ability	Yes Hands on Training, Viva-Voce, End Semester Exams

Paper: BTEE-601-18 Power Systems – II (Operation & Control)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Use numerical methods to analyze a power system													Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand stability constraints in a synchronous			v	v			v	v				v	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand methods to control the voltage, from			v	v			v	v				v	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the monitoring and control of a power			v	v			v	v				v	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand the basics of power system economics			v	v			v	v				v	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-602-18 Power Generation and Economics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the load curves, load-duration Curve			v	v									Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the power plant economics and the				v									Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3:Explore the significance of economic operation			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the hydro-thermal coordination			v	v									Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-611-18 Electronics Design Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the practical issues related to practical	v	v	v	v	v	v	v	v	v	v	v	v	Understand	Yes Hands on work, Viva-Voce, End Semester Exams
CO2:Choose appropriate components, software and	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Hands on work, Viva-Voce, End Semester Exams
CO3:Design a Printed Circuit Board, get it made and	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Hands on work, Viva-Voce, End Semester Exams
CO4:Work as a team with other students to implement	v	v	v	v	v	v	v	v	v	v	v	v	Comprtion	Yes Hands on work, Viva-Voce, End Semester Exams

Paper: BTEE-612-18 Power Systems-II Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Hands-on and computational experiments related			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-621-18 Project -I

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Apply and verify basic scientific principals and	v		v	v	v	v	v	v	v	v			Apply	Yes Hands on work, Viva-Voce, End Semester Exams
CO2:Identify the scope of interdisciplinary knowledge		v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Hands on work, Viva-Voce, End Semester Exams
CO3:Make and design a prototype which is preferable	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Hands on work, Viva-Voce, End Semester Exams

Paper: BTEE-603A-18 Electromagnetic Waves

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Analyze transmission lines and estimate voltage			v	v	v	v	v	v	v				Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2:Provide solution to real life plane wave problem			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3:Analyze the field equations for wave propagation			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4:Visualize TE and TM mode patterns of field distribution		v											Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand and analyze radiation by antennas			v										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-603-B-18 Power System Dynamics and Control

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the problem of power system stability			v	v									Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyze linear dynamical systems and use of			v	v	v	v	v	v	v	v	v	v	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3:Model different power system components for	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the need and plan the methods to			v	v									Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-603C-18 Electrical Drives

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
-----------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	-------	--------------	---

Head
 Department of Electrical Engineering
 I.K. Gujral Punjab Technical University,
 Kapurthala-144006

CO1: Understand the characteristics of dc motors and speed control of			V	V								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the principles of speed control of			V	V								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Apply the knowledge of power electronics to	V	V										Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Apply the knowledge of control system for the	V	V										Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Understand the working of AC and DC drives			V	V								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-603D-18 Wind and Solar Energy Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the global energy scenario and the			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the basic physics of wind and solar			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Apply the knowledge of electrical machines to	V	V											Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the power electronic interfaces for			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Understand the issues related to the grid inter			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-604A-18 High Voltage Engineering

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic physics related to various			V	V						V			Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge of generation and measurement of	V	V								V			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge of tests on H. V. equipment and on	V	V								V			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Knowledge of how over-voltages arise in a powe	V	V								V			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-604B-18 Power System Reliability

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic quantitative reliability an			V	V							V		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the reliability modeling and analys			V	V							V		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge of reliability assessment for elem	V	V									V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the risk analysis in power system			V	V							V		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-604C-18 Line-Commutated and Active PWM Rectifiers

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Analyse controlled rectifier circuits.			V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the operation of line-commutated			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the operation of PWM rectifiers			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-604D-18 Energy Efficient Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the basic electricity billing and ele			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the refrigeration and air condition			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge of light source, choice of lighting, li	V	V												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the diesel generating system and			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC-103-18 Education, Technology and Society

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC-104-18 History of Science and Technology in India

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC-113-18 Values and Ethics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC-118-18 Introduction to Women's and Gender Studies

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC-124-18 Sanskrit Bhasa

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC (MME-303) Law and Engineering

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: students will be able to integrate their techn	V	V								V	V	V		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: DEE-101-18 Control Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understanding the model of linear-time-invar			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understanding state-space representations.			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge of the concept of stability	V	V												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Assessment for linear-time invariant systems.	V	V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Knowledge of non-linear systems	V	V												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Head
 Department of Electrical Engineering
 I.K. Gujral Punjab Technical University
 Kapurthala-144006

Paper: OEE-102-18 Power Electronics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Knowledge of power semiconductor switches	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the working of various types of converters			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Apply the ac-dc and dc-dc converter in field													Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-103-18 Electrical Energy Conservation & Auditing

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Knowledge of the energy conservation/saving	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge of energy conservation opportunities	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the Demonstrate skills required for energy conservation			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the Suggest cost-effective measures for energy conservation			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-104-18 Renewable Energy Sources

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Knowledge of the basic properties of different renewable energy sources	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge of the main elements of technical specification of different renewable energy sources	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the advantages and disadvantages of different renewable energy sources			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the energy potential of renewable energy sources			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-201-18 Electric Machines

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Summarize the basics of Single-Phase Machine	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Acquire knowledge about testing and applications of different types of electric machines			v	v									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the concepts of Stepper Motors, synchronous and asynchronous motors			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the basic concept of DC Machines			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Explain the basic concepts of universal and repulsion induction motor	v	v								v	v	v	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-202-18 Industrial Electrical Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the electrical wiring systems for residential and commercial buildings			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand various components of industrial electrical systems			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyze and select the proper size of various electrical components			v	v	v	v	v	v	v	v	v	v	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-203-18 Wind and Solar Energy Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the energy scenario and the concept of different renewable energy sources			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the basic physics of wind and solar energy			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the power electronic interfaces for wind and solar energy			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the issues related to the solar technology			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-204-18 Power Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Awareness of supply system	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understanding of the material used and construction of power system			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Enable the students to do analysis of power transmission system			v	v	v	v	v	v	v	v	v	v	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the cables used in power system			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Knowledge of neutral grounding	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-721-18 Project-2

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Apply and verify basic scientific principals and engineering concepts	v	v											Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Application of interdisciplinary knowledge	v	v											Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: To identify possible product that can be made			v	v	v	v	v	v	v	v	v	v	Ability	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-701A-18 Electrical Energy Conservation and Auditing

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the current energy scenario and in energy conservation			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the methods of improving energy conservation			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the concepts of different energy conservation measures			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-701B-18 Computer Aided Power System Analysis

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To introduce computer applications in the analysis of power system	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To understand the solution methods and technical specifications of power system			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To solve numerically the complex IEEE bus network			v	v	v	v	v	v	v	v	v	v	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-701C-18 Power Quality and FACTS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To introduce the fundamental concepts relevant to power quality	v	v											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To enable the students to understand the factors affecting power quality			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To provide basic understanding of the emerging power quality issues			v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To enable students to design power electronic devices for power quality improvement	v	v	v	v									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Department of Electrical Engineering
 I.K. Gujral Punjab Technical University

Paper: BTEE-701D-18 Electrical and Hybrid Vehicles

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the conventional vehicles models			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the different possible ways of energy storage			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Compare the different strategies related to energy storage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-702A-18 Computational Electromagnetics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic concepts of Electrostatics			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand computational techniques for computation			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Apply the techniques to simple real-life problems														Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-702B-18 Microcontroller and PLC

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To understand the working of a microprocessor			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: To learn configuring and using different peripheral devices			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: To compile and debug a Program in PLC			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Ability	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-702C-18 Control Systems Design

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand various design specifications			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Design controllers to satisfy the desired design specifications	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Design controllers using the state-space approach	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-702D-18 Distributed Generation

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To impart knowledge about distributed generation	✓	✓												Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Their interconnection in grid	✓	✓												Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: To understand relevance of power electronics			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-703A-18 Industrial Electrical Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the electrical wiring systems for residential and commercial buildings	✓	✓	✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand various components of industrial electrical systems			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyze and select the proper size of various electrical equipment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-703B-18 Restructured Power Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To impart knowledge about the restructuring of power systems	✓	✓												Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: To introduce the fundamental concepts relevant to transmission pricing, models of deregulation	✓	✓	✓	✓										Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: To introduce the fundamental concepts relevant to ancillary services and international experience of deregulation	✓	✓	✓	✓										Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: To enable the students to understand the basic concepts of restructuring			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-703C-18 Advanced Electric Drives

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the operation of power electronic converters			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the vector control strategies for ac drives			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the implementation of the control strategies			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-703D-18 Energy Storage System

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the different possible ways of energy storage			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the different strategies related to energy storage			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Link the real-life examples with various industrial applications	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-721-18 One Semester Training

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
----------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	-------	-------	--

CO1:

Paper: BTEE-801-18 Smart Grids

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand technologies for smart grid			✓	✓										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Appreciate the smart transmission as well distribution systems	✓	✓	✓	✓										Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Realize the distribution generation and smart distribution systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Know the regulations and market models for smart grids	✓	✓	✓	✓										Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-802-18 Artificial Intelligence Techniques

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
----------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	-------	-------	--

Head
Head
 Department of Electrical Engineering
 Gujral Punjab Technical University
 Mohali-144006
 Phone: 144006

CO1: Demonstrate knowledge of the building blocks	v	v																Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Develop intelligent algorithms for constraint satisfaction	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Attain the capability to represent various real life situations			v	v	v	v	v	v	v	v	v	v	v	v	v	v	v	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-803-18 Indian Electricity Standards and Practices

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SB	Focus	Assessment Tools to Measure Attainment of CO
CO1: To know various definitions used in Indian electricity	v	v												Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: how to get a new connection and enhancement	v	v	v	v										Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Authority and responsibility associated with power												v	v	Learn	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-811-18 Modelling and Simulation Lab

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SB	Focus	Assessment Tools to Measure Attainment of CO
CO1: Design of primary and secondary transmission	v	v	v	v	v	v	v	v	v	v	v	v	v	Analyze	Yes Experiments, Viva-Voce, End Semester Exams
CO2: To distinguish power flows and conversion systems	v	v	v	v										Knowledge	Yes Experiments, Viva-Voce, End Semester Exams

Gurandeep

(Signature of Head of Department)

[Signature]

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala-144006

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala-144006

Name of Department: Electrical Engineering Program: M.Tech Electrical Engineering (Power System)

Paper: EEPS-101-18 POWER SYSTEM ANALYSIS-I

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1: To calculate voltage phasors at all buses , given the data	v	v					v	v	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Able to calculate fault currents in each phase							v	v	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Rank various contingencies according to their severity	v						v	v	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Estimate the bus voltage phasors given various quantities viz. power flow, voltages, taps , CB status etc			v				v	v	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Estimate closeness to voltage collapse and calculate PV curves using continuation power flow		v					v	v	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-102-18 POWER SYSTEM DYNAMICS-I

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Understand the modeling of synchronous machine in de	v								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Carry out simulation studies of power system dynamics			v	v					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Carry out stability analysis with and without power syste			v	v					Identify	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the load modeling in power system	v								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-103A-18 RENEWABLE ENERGY SYSTEM

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Knowledge about renewable energy	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the working of distributed generation system	v								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: 3. Know the Impact of Distributed Generation on Power System											

Paper: EEPS-103B-18 SMART GRIDS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Appreciate the difference between smart grid & convent	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Apply smart metering concepts to industrial and comm	v								Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Formulate solutions in the areas of smart substations, distributed		v	v						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Come up with smart grid solutions using modern communication		v	v						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-103C-18 HIGH POWER CONVERTERS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Learn the characteristics of PSDs such as SCRs, GTOs, IGBT	v								Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of working of multi-level VSIs, DC-DC switch	v		v						Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Acquire knowledge of power conditioners and their appl	v	v							Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Ability to design power circuit and protection circuit of H	v			v					Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-103D-18 WIND AND SOLAR SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Appreciate the importance of energy growth of the pow	v	v							Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Demonstrate the knowledge of the physics of wind powe	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Demonstrate the knowledge of physics of solar power p	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Identify, formulate and solve the problems of energy crises using	v	v							Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-104A-18 ELECTRICAL POWER DISTRIBUTION SYSTEM

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of power distribution system	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Study of Distribution automation and its application in p	v			v					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: 3. To learn SCADA system	v	v	v						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-104-B-18 MATHEMATICAL METHODS FOR POWER ENGINEERING

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Knowledge about vector spaces, linear transformation, e	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:2. To learn about linear programming problems and understandin	v		v						Investigation	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:3.Acquire knowledge about nonlinear programming and	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understanding the concept of random variables, functions of ran	v	v							Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand stochastic processes and their classification		v	v						Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-104C-18 PULSE WIDTH MODULATION FOR PE CONVERTERS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Appreciate importance of PWM techniques	v								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Implement PWM using different strategies		v	v						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Control CSI and VSI using PWM		v	v						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Compare performance of converter for different PWM te		v	v						Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-104-D-18 ELECTRIC AND HYBRID VEHICLES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO
CO1:Acquire knowledge about fundamental concepts, principl	v	v	v	v					Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To learn electric drive in vehicles / traction.	v	v	v						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical Unive
Wardha-144006

Paper: MTRM-101-18 RESEARCH METHODOLOGY AND IPR

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Understand research problem formulation. Analyze research	V								Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Follow research ethics			V						Ability	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand that today's world is controlled by Computer	V								Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understanding that when IPR would take such importance	V								Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams

CO5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Paper: EEP5-105-18 POWER SYSTEM STEADY STATE ANALYSIS LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Understand the power system operational problems.	V					V	V		Understand	Yes Experiments, Viva-Voce, End Semester Exams
CO2: Apply the load flow methods, fault analysis techniques a		V	V			V	V		Apply	Yes Experiments, Viva-Voce, End Semester Exams
CO3: Applications of power electronic devices in power system		V	V	V		V	V		Usage	Yes Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-106A-18 POWER SYSTEM DYNAMICS LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Do stability analysis for small signal stability	V	V				V	V		Knowledge	Yes Experiments, Viva-Voce, End Semester Exams
CO2: Analyze the single machine system using models		V	V			V	V		Analyze	Yes Experiments, Viva-Voce, End Semester Exams
CO3: Simulink models considering excitation systems.		V	V	V		V	V		Design	Yes Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-106B-18 RENEWABLE ENERGY LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Various power curves considering different renewable s	V						V		Knowledge	Yes Experiments, Viva-Voce, End Semester Exams
CO2: Analyze the effect of variations of parameters on solar p		V	V				V		Analyze	Yes Experiments, Viva-Voce, End Semester Exams
CO3: Analyze the wind power		V	V				V		Analyze	Yes Experiments, Viva-Voce, End Semester Exams

Paper: MTA-101A-18 ENGLISH FOR PAPER WRITING

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Improve writing and readability levels for English	V							V	Learn	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: How to write and what write according to section	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Skills in title writing	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-101B-18 DISASTER MANAGEMENT

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Know, how to reduce disaster risk and humanitarian res	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Policy and practice for disaster risk reduction	V							V	Challenge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the practical relevance of conflict situations	V		V					V	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Planning, programming and strength and weakness of d	V	V	V					V	Challenge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-101C-18 SANSKRIT FOR TECHNICAL EDUCATION

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Understanding basic Sanskrit language	V							V	Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Ancient Sanskrit literature about science & technology c								V	Challenge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Being a logical language will help to develop logic in stu								V	Challenge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-101D-18 VALUE EDUCATION

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Knowledge of self-development	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Learn the importance of Human values	V							V	Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Developing the overall personality	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-201-18 DIGITAL PROTECTION OF POWER SYSTEM

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Learn the importance of Digital relays	V							V	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Apply Mathematical approach towards protection		V	V					V	Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Learn to develop various Protection algorithms	V			V				V	Ability	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-202-18 POWER SYSTEM DYNAMICS-II

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Gain valuable insights into the phenomena of power sys	V								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the power system stability problem.	V								Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyze the stability problems and implement modern c		V	V						Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Simulate small signal and large signal stability problems		V	V	V					Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-203A-18 RESTRUCTURED POWER SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Describe various types of regulations in power systems.	V								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Identify the need of regulation and deregulation.		V	V						Identification	Yes Mid-Term Tests, Tutorials, End Semester Exams

Head
Department of Electrical Engineering
J. J. Gujral Rajasthan Technical University
Kapurthala-147006

CO3: Define and describe the Technical and Non-technical issues	✓									Challenge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Identify and give examples of existing electricity markets	✓	✓	✓							Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Classify different market mechanisms and summarize them	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-203B-18 ADVANCED DIGITAL SIGNAL PROCESSING

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Knowledge about the time domain and frequency domain	✓								✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Study the design techniques for FIR and IIR filters and their applications	✓		✓	✓					✓	Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Acquire knowledge about the finite word length effects	✓					✓			✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Knowledge about the various linear signal models and their applications	✓								✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Design of optimum FIR and IIR filters						✓			✓	Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-203C-18 DYNAMICS OF ELECTRICAL MACHINES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Formulation of electro-dynamic equations of all electrical machines	✓	✓	✓							Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge of transformations for the dynamic analysis of electrical machines	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge of determination of stability of the machines	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Study about synchronous machine										Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-203D-18 POWER APPARATUS DESIGN

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: To give a systematic approach for modeling and analysis of electrical machines	✓	✓	✓	✓	✓	✓				Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Ability to model and design all types of rotation machines including special machines	✓	✓	✓	✓	✓	✓				Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-204A-18 ADVANCED MICRO-CONTROLLER BASED SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: A processor in assembly language and develop an advanced program	✓	✓	✓		✓	✓				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To learn configuring and using different peripherals in a microcontroller	✓	✓	✓	✓	✓	✓				Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To compile and debug a Program				✓	✓	✓				Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To generate an executable file and use it				✓	✓	✓				Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-204B-18 SCADA SYSTEMS AND APPLICATIONS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Describe the basic tasks of Supervisory Control Systems	✓				✓					Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Acquire knowledge about SCADA architecture, various applications	✓	✓	✓		✓					Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge about single unified standard architecture IEC 61850	✓				✓					Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To learn about SCADA system components: remote terminal unit, master station	✓				✓					Utilization	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Learn and understand about SCADA applications in transmission and distribution	✓				✓					Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-204C-18 POWER QUALITY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Acquire knowledge about the harmonics, harmonic interference	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To develop analytical modeling skills needed for modeling of power systems	✓	✓	✓	✓						Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To introduce the student to active power factor correction techniques	✓	✓	✓	✓	✓	✓				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To introduce the student to series and shunt active power filters	✓	✓			✓	✓				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-204D-18 ARTIFICIAL INTELLIGENCE TECHNIQUES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Learn the concepts of biological foundations of artificial neural networks	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Learn Feedforward networks and radial basis function networks	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Identifications of fuzzy and neural network applications			✓							Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Acquire the knowledge of GA	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-205A-18 POWER SYSTEM PROTECTION LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Understand the performance of protection relays with different settings	✓	✓	✓		✓	✓				Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Modelling of relay and understand principle of different protection relays	✓			✓	✓	✓				Designing	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-205B-18 POWER QUALITY LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Understand and analyze power quality issues	✓	✓	✓			✓				Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Performance and analysis of occurrence of harmonics in power systems		✓	✓			✓				Analysis	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Knowledge of grounding techniques	✓					✓	✓			Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-206A-18 ARTIFICIAL INTELLIGENCE LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Write programs using AI techniques	✓	✓	✓	✓						Designing	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Learn AI oriented power applications	✓									Understand	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: EEP5-205B-18 POWER ELECTRONICS APPLICATIONS TO POWER SYSTEMS LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of	Assessment Tools to Measure Attainment of CO	
CO1: Design and analyze power electronic converters	✓	✓	✓	✓						Designing	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Design and analyze power electronic converters	✓									Understand	Yes	Experiments, Viva-Voce, End Semester Exams

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala

Handwritten signature: *Harpreet Singh*

CO1: Understand and analyze the performance of converters	v	v	v		v	v		Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Performance analysis of drive		v	v		v	v		Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: EEPS-206C-18 SMART GRIDS LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: To understand structure of smart grid and micro grid	v				v	v			Understand	Yes Experiments, Viva-Voce, End Semester Exams
CO2: Power quality issues for grid connected renewable source	v	v	v		v	v			Analyze	Yes Experiments, Viva-Voce, End Semester Exams

Paper: MTA-105-18 CONSTITUTION OF INDIA

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Discuss the growth of the demand for civil rights in India	v						v	v	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Discuss the intellectual origins of the framework of argument	v						v	v	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Discuss the circumstances surrounding the foundation of the Constitution	v						v	v	Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Discuss the passage of the Hindu Code Bill of 1955.	v						v	v	Challenge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-106-18 PEDAGOGY STUDIES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: What pedagogical practices are being used by teachers in the classroom?	v						v		Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: What is the evidence on the effectiveness of these pedagogical practices?	v						v		Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: How can teacher education (curriculum and practice) and the school curriculum and guidance materials best support effective pedagogy?									Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-107-18 STRESS MANAGEMENT BY YOGA

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Develop healthy mind in a healthy body thus improving efficiency	v					v			Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Improve efficiency	v					v			Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTA-108-18 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Study of Shrimad-Bhagwad-Geeta will help the student to understand the concept of Karma	v								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: The person who has studied Geeta will lead the nation a better way	v								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Study of Bhagavad-Gita will help in developing versatile personality of students.	v								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-301A-18 POWER SYSTEM TRANSIENTS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Knowledge of various transients that could occur in power system	v								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Ability to design various protective devices in power system	v	v	v						Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Coordinating the insulation of various equipments in power system							v		Coordination	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Modelling the power system for transient analysis				v					Designing	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-301B-18 FACTS AND CUSTOM POWER DEVICES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1:1. Acquire knowledge about the fundamental principles of FACTS	v								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2:2. Learn various Static VAR Compensation Schemes like SVC, STATCOM, etc.	v	v							Ability	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3:3. To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.	v	v	v	v					Designing	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-301C-18 INDUSTRIAL LOAD MODELING AND CONTROL

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Knowledge about load control techniques in industries	v						v		Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Learn different types of industrial processes and optimize them	v						v		Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Apply load management to reduce demand of electricity in industries	v	v	v				v		Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Apply different energy saving opportunities in industries	v	v	v				v		Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-301D-18 DYNAMICS OF LINEAR SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: To learn linear system modeling, analysis and design so that the system is stable	v						v		Understand	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge on carrying out detailed stability analysis of linear systems	v						v		Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO3: Design observers and controllers for linear systems		v	v	v			v		Designing	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO4: Acquire knowledge of discrete time linear systems modeling	v						v		Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO5: Develop and utilize modern software tools for analysis and design of linear continuous and discrete time systems					v		v		Designing	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301A-18 BUSINESS ANALYTICS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Students will demonstrate knowledge of data analytics.	v	v	v						Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Students will demonstrate the ability of think critically in data analytics.	v	v	v						Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical Unive.
Kapurthala-144006

CO3: Students will demonstrate the ability to use technical skills	✓	✓	✓						Identify	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Students will demonstrate the ability to translate data into clear, actionable insights.	✓	✓	✓						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301B-18 INDUSTRIAL SAFETY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO	
CO1: To know about industrial safety and ways of prevention	✓				✓			✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Learn about fault identification and periodic maintenance	✓	✓			✓			✓	Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To get knowledge about all safety measures	✓				✓			✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301C-18 OPERATIONS RESEARCH

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO	
CO1: Students should be able to apply the dynamic programming	✓				✓				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Students should be able to apply the concept of non-linear	✓				✓				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Students should be able to carry out sensitivity analysis	✓	✓	✓		✓				Analysis	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Students should be able to carry out sensitivity analysis	✓	✓	✓		✓				Analysis	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301D-18 COST MANAGEMENT OF ENGINEERING PROJECTS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO	
CO1: Understand cost management process	✓					✓	✓		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To execute project considering cost factor		✓	✓			✓	✓		Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To manage planning of cost and learn about the techniques	✓					✓	✓		Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301E-18 COMPOSITE MATERIALS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO	
CO1: Learn about composite materials and their process of reinforcement	✓								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand about strength and manufacturing of matrix	✓								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301F-18 WASTE TO ENERGY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO	
CO1: Know about the energy in biomass waste	✓						✓		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the biomass fuel conversion process for energy	✓						✓		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Know about biomass waste properties	✓						✓		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Gurandeep
(Signature of Head of Department)

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala-144006

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kapurthala-144006

Name of Department: Electrical Engineering

Draft of Mapping of M. Tech. Electrical Engineering (Power Systems and Renewable Energy)

MAPPING POS AND COS

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kaourthala-144006

--Draft--

MAPPING POs AND COs												
Focus: refers to "Focus on employability/ entrepreneurship/ skill development"												
PSRE-101/21												
COMPUTER AIDED POWER SYSTEM ANALYSIS												
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO	
CO1: Understand various methods of load flow and their advantages and disadvantages	✓								Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
CO2: Analyze various types of faults in power system	✓	✓							Analysis	Yes	Mid-semester tests, Assignments, End-semester examination	
CO3: Understand power system security concepts and rank the contingencies	✓		✓						Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
CO4: Estimate closeness to voltage collapse and calculate PV curves.	✓		✓						Evaluation	Yes	Mid-semester tests, Assignments, End-semester examination	
PSRE-102/21												
DISTRIBUTED GENERATION												
CO1: Understand the planning and operational issues related to Distributed Generation.	✓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO2: Analyse the impact of Distributed Generation		✓								Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the Micro-grids		✓								Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Analyse the micro-grids		✓								Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
		✓								Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-103/21												
FACTS AND CUSTOM POWER DEVICES												
CO1: Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.	✓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO2: Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.		✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Reactive Power Systems, PWM Inverter based Reactive Power Systems and their controls.	✓	✓								Learning	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.		✓			✓					Application	Yes	Mid-semester tests, Assignments, End-semester examination
		✓			✓					Analyse	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-103B/21												
ADVANCED POWER SYSTEMS PROTECTION												
CO1: Learn about classification and operation of static relays.	✓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
		✓			✓					Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination

[Handwritten signatures and initials]

Mapping of M. Tech. Electrical Engineering (Power Systems and Renewable Energy)

CO2:	Understand the basic principles and application of comparators.		✓	✓												Learn	Yes	Mid-semester tests, Assignments, End-semester examination	
CO3:	Understand static version of different types of relays.		✓	✓												Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination	
CO4:	Understand about numerical protection techniques.				✓											Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
PSRE-103C/21 MATHEMATICAL METHODS FOR POWER ENGINEERING																			
COs																			
CO1:	Knowledge about vector spaces, linear transformation, eigenvalues and eigenvectors of Linear operators	✓														Knowledge	Focus	Assessment tools to measure attainment of CO	
CO2:	Learn about linear programming problems and understanding the simplex method for solving linear programming problems in various fields of science and technology	✓														Understanding	Yes	Mid-semester tests, Assignments, End-semester examination	
CO3:	Acquire knowledge about nonlinear programming and various techniques used for solving constrained and unconstrained nonlinear programming problems	✓														Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination	
PSRE-103D/21 ANALYSIS OF POWER CONVERTER																			
COs																			
CO1:	Develop a systematic approach AC-DC converters		✓													Skill	Focus	Assessment tools to measure attainment of CO	
CO2:	Develop a systematic approach for modeling and analysis PWM Inverters		✓													Application	Yes	Mid-semester tests, Assignments, End-semester examination	
CO3:	Ability to model of Multilevel Inverters			✓												Application	Yes	Mid-semester tests, Assignments, End-semester examination	
CO4:	Analysis of boost power factor corrected rectifier.	✓														Analysis	Yes	Mid-semester tests, Assignments, End-semester examination	
PSRE-104A/21 SOLAR PV ENERGY SYSTEM																			
COs																			
CO1:	Understand the concept of Solar Radiation Geometry.	✓														Skill	Focus	Assessment tools to measure attainment of CO	
CO2:	Understand the Solar Cells Conversion of Solar energy.			✓												Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
CO3:	Understand the Solar Photovoltaic System Design.			✓												Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
CO4:	Introduction of Solar Photo Voltaic System Testing Sun Simulator			✓												Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination	
PSRE-104B/21 WASTE TO ENERGY CONVERSION TECHNOLOGIES																			
COs																			
CO1:																Skill	Focus	Assessment tools to measure attainment of CO	

Handwritten signature and initials

CO1: Understand the issues related with waste and its impact on environment.											Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of different type of disposal mechanism for handling different type of waste.											Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the analyse concept of recovery from industrial and agricultural waste											Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of rural issues and the handling of biomass.											Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-104C/21													
SMALL HYDRO AND NON-CONVENTIONAL TECHNOLOGIES													
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8			Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand the issues Small-hydro systems.		✓						✓			Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of different type of Energy from Oceans	✓		✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the analyse concept of Geothermal Energy	✓		✓	✓				✓			Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of Magneto Hydro Dynamic.											Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-104D/21													
SOLAR ENERGY CONVERSION TECHNOLOGIES													
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8			Skill	Focus	Assessment tools to measure attainment of CO
CO1: Evaluate the solar thermal devices	✓	✓									Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Optimize the solar thermal power generating system.		✓	✓								Apply	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge of solar passive concepts and their application to buildings	✓										Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understanding of government schemes & policies on solar energy.						✓		✓			Understand	Yes	Mid-semester tests, Assignments, End-semester examination
MTRM-101/21													
RESEARCH METHODOLOGY AND IPR													
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8			Skill	Focus	Assessment tools to measure attainment of CO
CO1: To understand research problem formulation and research ethics				✓							Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: To understand about control of information technology				✓	✓						Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To understand the need of IPR & its protection				✓							Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-105/21													
COMPUTER AIDED POWER SYSTEM ANALYSIS LAB													
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8			Skill	Focus	Assessment tools to measure attainment of CO

Mapping of M. T. Electrical Engineering (Power Systems : Renewable Energy)

CO1: To understand the formation of Y and Z bus	✓									Understand	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO2: To understand how to analyze the power system load flow studies. Faults occurring in power system	✓			✓						Evaluation	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO3: To understand the security analysis	✓			✓						Understand	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO4: To understand the commercial software used by industry	✓			✓						Knowledge	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
PSRE-106/21 POWER SIMULATION LAB-I COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO	
CO1: Various power curves considering different renewable sources	✓				✓				Knowledge	Yes	Hands-on work/simulation, viva-voce, end semester practical examination	
CO2: Evaluate the capability of fuel cells and capacitors		✓			✓				Evaluation	Yes	Hands-on work/simulation, viva-voce, end semester practical examination	
CO3: Understand practical issues related to wind power			✓					✓	Understand	Yes	Hands-on work/simulation, viva-voce, end semester practical examination	
CO4: Analyze the effect of variations of parameters on solar panels								✓	Analysis	Yes	Hands-on work/simulation, viva-voce, end semester practical examination	
MTA-101/21 ENGLISH FOR RESEARCH PAPER WRITING COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO	
CO 1: Understand that how to improve your writing skills and level of readability							✓		Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
CO 2: Learn about what to write in each section							✓		Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination	
CO 3: Understand the skills needed when writing a Title							✓		Understand	Yes	Mid-semester tests, Assignments, End-semester examination	
MTA-102/21 DISASTER MANAGEMENT COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO	
CO1: Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.			✓						Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination	
CO2: Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.			✓						Evaluate	Yes	Mid-semester tests, Assignments, End-semester examination	

Copy No. 18

CO3: Develop an understanding of standards of humanitarian response and practical relevance inspecific types of disasters and conflict situations.												Synthesis	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or thecountries they work in												Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
MTA-103/21 SANSKRIT FOR TECHNICAL KNOWLEDGE														
CO1: To get a working knowledge in illustrious Sanskrit, the scientific language in the world	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8				Skill	Focus	Assessment tools to measure attainment of CO
CO2: Learning of Sanskrit to improve brain functioning				✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Learning of Sanskrit to develop the logic in mathematics, science & othersubjects enhancing the memory power.				✓								Application		Mid-semester tests, Assignments, End-semester examination
CO4: The engineering scholars equipped with Sanskrit will be able toexplore the huge knowledge from ancient literature	✓		✓									Application	Yes	Mid-semester tests, Assignments, End-semester examination
MTA-104/21 VALUE EDUCATION														
CO1: Understand value of education and self- development	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8				Skill	Focus	Assessment tools to measure attainment of CO
CO2: Imbibe good values in students						✓						knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Let the should know about the importance of character						✓						Application	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-201/21 ENERGY FORECASTING AND MODELING														
CO1: Interpret the Energy & GDP, GNP and its dynamics	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8				Skill	Focus	Assessment tools to measure attainment of CO
CO2: Develop energy system models for short term and long-term forecasting	✓											Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge about different Energy Sources		✓			✓							Synthesis	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge about different types of Development of Energy Optimization Model												Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-202/21 POWER SYSTEM GENERATION CONTROL														
CO1: To study the unit commitment problem for economic load dispatch.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8				Skill	Focus	Assessment tools to measure attainment of CO
	✓	✓										Learn	Yes	Mid-semester tests, Assignments, End-semester examination

Handwritten signature and initials.

CO2: To study the load frequency control of single area and two area systems with and without control.	✓	✓											Learn	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To study the effect of generation with limited energy supply.	✓	✓											Comprehend	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To study the effectiveness of interchange evaluation in interconnected power systems.	✓	✓											Learn	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203A/21															
POWER QUALITY AND HARMONIC ANALYSIS															
CO1: To understand significance of power quality and power quality parameters.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8					Skill	Focus	Assessment tools to measure attainment of CO
CO2: To understand harmonics, their effects, harmonic indices and harmonic minimization techniques			✓										Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Formulate energy action planning for various types of industry.			✓										Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To understand different compensation techniques to minimize power quality disturbances.								✓					Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203B/21															
POWER SYSTEM DYNAMICS															
CO1: Understand the modeling of synchronous machine in details	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8					Skill	Focus	Assessment tools to measure attainment of CO
CO2: Development of mathematical models for synchronous machine	✓												Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Analysis and physical interpretation of models of Synchronous machine			✓										Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Modeling of induction motor and Understand the load modeling in power system.			✓										Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
													Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203C/21															
RELIABILITY ANALYSIS AND PROTECTION															
CO1: Have knowledge of different methods to estimate different electrical quantities	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8					Skill	Focus	Assessment tools to measure attainment of CO
CO2: Acquire skills in planning and building reliable power system.	✓												Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Manage skills required in the field of power system engineering are enhanced.				✓									Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understand about modes of failure and calculate relevant indices.				✓									Application	Yes	Mid-semester tests, Assignments, End-semester examination
								✓					Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203D/21															
ENERGY ECONOMICS AND POLICIES															
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8					Skill	Focus	Assessment tools to measure attainment of CO

Handwritten signature and initials.

Name of Department: Electrical Engineering
 Mapping of M. Te) Electrical Engineering (Power Systems and Renewable Energy)

CO1: understand the importance of energy in economic development.										✓	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Understand the need of sustainable energy.										✓	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the issues related to energy pricing taxes										✓	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Take up research in energy economics.										✓	Application	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204A/21 ELECTRIC AND HYBRID VEHICLES													
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Know the concept of electric vehicles and hybrid electric vehicles.	✓										8	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Familiar with different motors used for hybrid electric vehicles.	✓				✓							Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the power converters used in hybrid electric vehicles	✓				✓							Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Know different batteries and other energy storage systems.	✓				✓							Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204B/21 SMART GRIDS													
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand concept of smart grid and developments on smart grid.	✓										8	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Understand smart grid technologies and application of smart grid concept in hybrid electric vehicles.	✓											Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Have knowledge on smart substations, feeder automation and	✓											Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of monitoring and protection of grid.	✓											Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204C/21 ENGINEERING OPTIMIZATION													
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand the need for optimization and different techniques involved and also constraints.	✓										8	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of Linear/Non-linear Programming.												Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the importance of optimization to solve Engineering problems												Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of genetic algorithm for Engineering Optimization												Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204D/21 ARTIFICIAL INTELLIGENCE TECHNIQUES													

Dr. N. S.

Name of Department: Electrical Engineering
 Mapping of M. Te) Electrical Engineering (Power Systems a.) Renewable Energy

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Learn the concepts of biological foundations of artificial neural networks	✓								Learning	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Learn Feedback networks and radial basis function networks and fuzzy logics	✓								Learning	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Identifications of fuzzy and neural network	✓								Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Acquire the knowledge of GA	✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-206/21 POWER SIMULATION LAB-II											
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO1: To understand power curves for energy sources	✓				✓				Knowledge	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO2: Effect of variable parameters on solar panels			✓		✓				Application	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO3: Relation of wind output and load.			✓		✓				Application	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
PSRE-206/21 RENEWABLE ENERGY LAB											
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Assess the performance of renewable sources of energy					✓			✓	Analysis	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO2: Knowledge of the scope of tapping geothermal energy					✓			✓	Knowledge	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO3: Field visit to assess the solar lighting					✓			✓	Application	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
CO4: Knowledge of the practical aspects of integration of renewable sources of energy to the grid					✓			✓	Knowledge	Yes	Hands-on work/simulation, viva-voce, end semester practical examination
MTA-105/21 CONSTITUTION OF INDIA											
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand the premises informing the twin themes of liberty and freedom from a civilrights perspective.			✓					✓	Understand	Yes	Mid-semester tests, Assignments, End-semester examination

Handwritten signatures and initials:
 [Signature]
 [Signature]
 [Signature]

NAME OF DEPARTMENT: Electrical Engineering
 Mapping of M. T. Electrical Engineering (Power Systems : Renewable Energy)

CO2: To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.											Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.											Application	Yes	Mid-semester tests, Assignments, End-semester examination
MTA-106/21 PEDAGOGY STUDIES													
CO1: Review existing evidence on the review topic to inform programme design and policymaking undertaken by the DfID, other agencies and researchers.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Analysis	Focus	Assessment tools to measure attainment of CO	Mid-semester tests, Assignments, End-semester examination
CO2: Identify critical evidence gaps to guide the development.				✓				✓	Analysis		Yes	Mid-semester tests, Assignments, End-semester examination	
MTA-107/21 STRESS MANAGEMENT BY YOGA													
CO1: To achieve overall health of body and mind	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Application	Focus	Assessment tools to measure attainment of CO	Mid-semester tests, Assignments, End-semester examination
CO2: To overcome stress				✓				✓	Application		Yes	Mid-semester tests, Assignments, End-semester examination	
MTA-108/21 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS													
CO1: To learn to achieve the highest goal happily a. To become a person with stable mind, pleasing personality and determination b. To awaken wisdom in students	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Synthesise	Focus	Assessment tools to measure attainment of CO	Mid-semester tests, Assignments, End-semester examination
PSRE-301A/21 INDUSTRIAL LOAD MODELING AND CONTROL													
CO1: Knowledge about load control techniques in industries and its application.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	Skill	Knowledge	Focus	Assessment tools to measure attainment of CO	Mid-semester tests, Assignments, End-semester examination
CO2: Different types of industrial processes and optimize the process using tools like LINDO and LINGO.				✓					Knowledge		Yes	Mid-semester tests, Assignments, End-semester examination	
CO3: Apply load management to reduce demand of electricity during peak time.			✓	✓					Application		Yes	Mid-semester tests, Assignments, End-semester examination	
CO4: Apply different energy saving opportunities in industries.			✓	✓					Application		Yes	Mid-semester tests, Assignments, End-semester examination	

Name of Department: Electrical Engineering (Power Systems a Renewable Energy)
 Mapping of M. Te) Electrical Engineering (Power Systems a Renewable Energy)

PSRE-301B/21 POWER SYSTEM DEREGULATION COs	PO										Skill	Focus	Assessment tools to measure attainment of CO
	1	2	3	4	5	6	7	8					
CO1: Knowledge about the restructuring and deregulation of power sector.	✓										Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Introduction to the fundamental concepts relevant to OASIS, congestion management etc.	✓		✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge of power market and its mitigation techniques	✓										Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understand the factors related with deregulation of power industry in different countries	✓		✓								Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-301C/21 SOLAR PV ENERGY SYSTEM COs	PO										Skill	Focus	Assessment tools to measure attainment of CO
1	2	3	4	5	6	7	8						
CO1: Understand the fundamental theory governing the photovoltaic devise	✓										Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Ability of carry out preliminary system design.		✓									Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge of testing and assessment of power generation by solar PV.			✓								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Analysis of solar data		✓									Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-301D/21 POWER SYSTEM GENERATION CONTROL COs	PO										Skill	Focus	Assessment tools to measure attainment of CO
1	2	3	4	5	6	7	8						
CO1: Knowledge of Automatic Generation and Control	✓										Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Understanding of the power system security and its analysis		✓									Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge of estimation and computation	✓			✓							Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Analyze the load requirement and forecast load										✓	Evaluation	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301A/21 BUSINESS ANALYTICS COs	PO										Skill	Focus	Assessment tools to measure attainment of CO
1	2	3	4	5	6	7	8						
CO1: Understand the role of business analytics within an organization.	✓			✓							Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization	✓										Analysis	Yes	Mid-semester tests, Assignments, End-semester examination

Handwritten signature and initials.

Mapping of M. T) Electrical Engineering (Power Systems) Renewable Energy)

CO3: To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making	✓								✓	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To become familiar with processes needed to develop, report, and analyze business data.	✓							✓		Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO5: Use decision-making tools/Operations research techniques.	✓							✓		Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO6: Marge business process using analytical and management tools.	✓								✓	Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO7: Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.	✓								✓	Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301B/21 INDUSTRIAL SAFETY												
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
CO1: Understand about industrial safety and maintenance engineering	1	2	3	4	5	6	7	8		Skill	Focus	Assessment tools to measure attainment of CO
CO2: Learn possible ways of prevention from wear and tear and methods of fault tracing			✓	✓						Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand periodic maintenance			✓	✓						Learning	Yes	Mid-semester tests, Assignments, End-semester examination
			✓	✓						Understand	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301C/21 OPERATIONS RESEARCH												
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
CO1: To learn the optimization techniques	1	2	3	4	5	6	7	8		Skill	Focus	Assessment tools to measure attainment of CO
CO2: How to formulate L.P.P and handling of Nonlinear programming	✓									learn	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: How to do the scheduling and sequencing of models					✓					Synthesize	Yes	Mid-semester tests, Assignments, End-semester examination
		✓								Application	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301D/21 COST MANAGEMENT OF ENGINEERING PROJECTS												
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
CO1: To get knowledge about cost concept and cost management process	1	2	3	4	5	6	7	8		Skill	Focus	Assessment tools to measure attainment of CO
CO2: To know about meaning and process of project execution				✓						Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To learn quantitative techniques and cost planning				✓						Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
				✓						Learning	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301E/21 COMPOSITE MATERIALS												
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
	1	2	3	4	5	6	7	8		Skill	Focus	Assessment tools to measure attainment of CO

Copy
No
✓

NAME OF DEPARTMENT: Electrical Engineering
 Mapping of M. T. Electrical Engineering (Power Systems) Renewable Energy

CO1: To understand composite materials and their reinforcement	✓															Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Manufacturing of matrix	✓															Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301F/21 WASTE TO ENERGY COs																		
CO1: Understand classification of waste and about energy from waste	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO
CO2: Process of biomass waste conversion to energy	✓		✓													Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To understand biomass waste properties			✓													Understand	Yes	Mid-semester tests, Assignments, End-semester examination
	✓		✓													Understand	Yes	Mid-semester tests, Assignments, End-semester examination

Signature

Head
 Department of Electrical Engineering
 I.K. Gujral Punjab Technical University
 Kaourthala-144006



Program Outcomes of Ph.D-Electrical Engineering

w.e.f: Batch 2021

The scholars who successfully completes their PhD programme in Electrical Engineering will be able to:

- PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.
- PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.
- PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience.
- PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kaourthala-144006

3 | Board of Studies (Electrical Engineering)
(14/10/2021)
IK Gujral Punjab Technical University

Handwritten signatures and initials:
Cipr
Mun
Jes
As



Course Outcomes of Ph.D Course Work		w.e.f: Batch 2021
CORE COURSES		
1.	Research Methodology	CO1: for a basic framework of research process. CO2: analyze and interprets the various research designs and techniques CO3: understand and apply ethical dimensions of conducting applied research and carrying inter-disciplinary research.
2.	Power System Engineering	CO1: to understand the applications of various compensation devices CO2: Apply the concept of FACTS controllers in advanced hybrid power research using modern engineering tools CO3: Study and analyze the stability under varying transient conditions
3.	Power Electronics	CO1: present the concepts of typical power electronic circuits: topologies and control. CO2: converter analysis, modeling, design and control of converters to different applications using modern engineering tools. CO3: design the controller for varied systems of engineering
4.	Electrical Drives Engineering	CO1: Understand the design, function, operation and control of all major components of a typical electric drive CO2: To develop the applications of multilevel inverter and its topologies in advanced research CO3: Understand the non-linear induction motor drives for various diverse applications
5.	Energy Management Engineering	CO1: Apply the concept of energy audit in the industry and extend to society for energy management awareness CO2: Start the consultancy on energy management and engineering CO3: Analyze and interprets the various lighting systems and HVAC systems
6.	Microelectronics and Control Systems	CO1: Design the optimal control for various diverse applications in advanced research CO2: Learn the various filtering techniques by applying digital signal processing in power system applications CO3: Interprets and compare the stability concept of various non-linear systems using engineering softwares
7.	Advanced Relaying and Protection	CO1: Learn to differentiate the unit and non-unit system of protection schemes CO2: Analyze and apply the various protection schemes for under various applications of thrust areas of research

4 Board of Studies (Electrical Engineering)
(14/10/2021)
IK Gujral Punjab Technical University

Head
Department of Electrical Engineering
IK Gujral Punjab Technical University
Kapurthala-144008

Handwritten signatures and initials



	CO3: To extend the development of prototypes of supervisory control schemes in research work
8.	Digital System Design CO1: To apply concepts and methods of digital system design techniques CO2: To understand the principle of operation of sequential machines CO3: To analyze and interprets the design of combinational and sequential digital systems for diverse applications of power systems
9.	Modelling and Analysis of Dynamic Systems CO1: Perform systematic choices of ideal elements for modeling a real dynamic system with mechanical, thermal, fluid and electrical elements and their interactions CO2: Develop the differential equations that describe the input/output behavior of a dynamic system CO3: Compute the input/output transfer function of a dynamic system for its analysis
10.	Bio Medical Signal Processing CO1: To understand the concept of nervous system and apply in neural networks. CO2: To analyze the research based non-electrical parameters and use in algorithms using modern engineering tools. CO3: Understand and interprets the principle of operation of biotelemetry systems and its applications.
11.	Sensors and Applications CO1: Gain the basic idea of measurements, characteristics and the errors associated with measurements and apply in advanced research meaningful for society CO2: Demonstrate the concept of resistive sensors which can be employed for real life applications CO3: Realize the concept of reactive sensors employed for real life applications
12.	Scientific and Analytical Instrumentation CO1: learn the basic concept of qualitative and quantitative analysis of a given sample. CO2: Learn various spectroscopic techniques with its instrumentation and apply in inter-disciplinary research. CO3: impart the concept of separation science and its application.
13.	Renewable Energy Resources CO1: Apply the basic properties of different renewable sources of energy and technologies using modern engineering tools CO2: Knowledge of the main elements of technical systems designed for utilization of renewable sources of energy CO3: Understand the advantages and disadvantages of different renewable sources of energy
14.	Presentation/ Seminar

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kaourthala-144006

5 Board of Studies (Electrical Engineering)
(14/10/2021)
IK Gujral Punjab Technical University

Sub *MS* *Op* *h*



	<p>CO1: To identify an area of research and demonstrate the ability to present the latest carried work and explains its societal benefits</p> <p>CO2: To ably link the carried study with its economic analysis and demonstrate its relative merits</p> <p>CO3: To ably carry forward its study using modern engineering softwares</p>
--	--

ELECTIVE COURSE	
1.	<p>Signal Processing</p> <p>CO1: Interpret, represent and process discrete/digital signals and systems</p> <p>CO2: Thorough understanding of frequency domain analysis of discrete time signals</p> <p>CO3: Ability to design & analyze DSP systems like FIR and IIR Filter</p>
2.	<p>Communication Systems</p> <p>CO1: Analyse communication systems in both the time and frequency domains.</p> <p>CO2: Describe the principles of amplitude modulated and angle modulated communication systems</p> <p>CO3: Describe the principles of various digital modulation systems and their properties</p>
3.	<p>VLSI Design and Embedded Systems</p> <p>CO1: Learn IC and ASIC Technology</p> <p>CO2: Understand the detailed working of combinational circuits</p> <p>CO3: Express the functioning of sequential circuits</p>
4.	<p>Linear Algebra</p> <p>CO1: acquire basic knowledge of matrix theory</p> <p>CO2 comprehend basic concept of vector space and linear transformation</p> <p>CO3 apply the knowledge of linear algebra in engineering problems</p>
5.	<p>Sensors for Ranging and Imaging</p> <p>CO1: Understand the constraints and limitations of a given ISM system in a given application</p> <p>CO2: Compare, contrast and select the most appropriate sensor modality</p> <p>CO3: Prepare a detailed sensor system specification</p>

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kaourthala-144006

6 | Board of Studies (Electrical Engineering)
(14/10/2021)
IK Gujral Punjab Technical University

Handwritten signatures and initials



COs		w.e.f. Batch 2021	POs
1.	Research Methodology CO1: for a basic framework of research process. CO2: analyze and interprets the various research designs and techniques CO3: understand and apply ethical dimensions of conducting applied research and carrying inter-disciplinary research.		PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas. PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience.
2.	Power System Engineering CO1: to understand the applications of various compensation devices CO2: Apply the concept of FACTS controllers in advanced hybrid power research using modern engineering tools CO3: Study and analyze the stability under varying transient conditions		PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society. PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.
3.	Power Electronics CO1: present the concepts of typical power electronic circuits: topologies and control. CO2: converter analysis, modeling, design and control of converters to different applications using modern engineering tools. CO3: design the controller for varied systems of engineering		PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas. PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.
4.	Electrical Drives Engineering CO1: Understand the design, function, operation and control of all major components of a typical electric drive CO2: To develop the applications of multilevel inverter and its topologies in advanced research CO3: Understand the non-linear induction motor drives for various diverse applications		PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society. PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience.
5.	Energy Management Engineering CO1: Apply the concept of energy audit in the industry and extend to society for energy management awareness		PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Jalandhar-144006

[Handwritten signatures]



	<p>CO2: Start the consultancy on energy management and engineering CO3: Analyze and interprets the various lighting systems and HVAC systems</p>	<p>the welfare and betterment of society. PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience. PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>
6.	<p>Microelectronics and Control Systems CO1: Design the optimal control for various diverse applications in advanced research CO2: Learn the various filtering techniques by applying digital signal processing in power system applications CO3: Interprets and compare the stability concept of various non-linear systems using engineering softwares</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas. PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society. PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>
7.	<p>Advanced Relaying and Protection CO1: Learn to differentiate the unit and non-unit system of protection schemes CO2: Analyze and apply the various protection schemes for under various applications of thrust areas of research CO3: To extend the development of prototypes of supervisory control schemes in research work</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas. PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.</p>
8.	<p>Digital System Design CO1: To apply concepts and methods of digital system design techniques CO2: To understand the principle of operation of sequential machines CO3: To analyze and interprets the design of combinational and sequential digital systems for diverse applications of power systems</p>	<p>PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society. PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience.</p>

[Handwritten signatures and initials]



9.	Modelling and Analysis of Dynamic Systems	
	<p>CO1: Perform systematic choices of ideal elements for modeling a real dynamic system with mechanical, thermal, fluid and electrical elements and their interactions</p> <p>CO2: Develop the differential equations that describe the input/output behavior of a dynamic system</p> <p>CO3: Compute the input/output transfer function of a dynamic system for its analysis</p>	<p>PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.</p>
10.	Bio Medical Signal Processing	
	<p>CO1: To understand the concept of nervous system and apply in neural networks.</p> <p>CO2: To analyze the research based non-electrical parameters and use in algorithms using modern engineering tools.</p> <p>CO3: Understand and interprets the principle of operation of biotelemetry systems and its applications.</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.</p> <p>PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.</p>
11.	Sensors and Applications	
	<p>CO1: Gain the basic idea of measurements, characteristics and the errors associated with measurements and apply in advanced research meaningful for society</p> <p>CO2: Demonstrate the concept of resistive sensors which can be employed for real life applications</p> <p>CO3: Realize the concept of reactive sensors employed for real life applications</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.</p> <p>PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.</p> <p>PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>
12.	Scientific and Analytical Instrumentation	
	<p>CO1: learn the basic concept of qualitative and quantitative analysis of a given sample.</p> <p>CO2: Learn various spectroscopic techniques with its instrumentation and apply in inter-disciplinary research.</p> <p>CO3: impart the concept of separation science and its application.</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.</p> <p>PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>
13.	Renewable Energy Resources	

Department of Electrical Engineering
IK Gujral Punjab Technical University
Kapurthala-144006

[Handwritten signatures]



	<p>CO1: Apply the basic properties of different renewable sources of energy and technologies using modern engineering tools</p> <p>CO2: Knowledge of the main elements of technical systems designed for utilization of renewable sources of energy</p> <p>CO3: Understand the advantages and disadvantages of different renewable sources of energy</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.</p> <p>PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.</p> <p>PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>
14.	Presentation/ Seminar	
	<p>CO1: To identify an area of research and demonstrate the ability to present the latest carried work and explains its societal benefits</p> <p>CO2: To ably link the carried study with its economic analysis and demonstrate its relative merits</p> <p>CO3: To ably carry forward its study using modern engineering softwares</p>	<p>PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas.</p> <p>PO 3: To demonstrate the leadership skills in the chosen research domain and communicates effectively both in oral and written formats to a diverse audience.</p> <p>PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.</p>

Head
Department of Electrical Engineering
I.K. Gujral Punjab Technical University
Kaourthala-144006

[Handwritten signatures]