1.1.3

Supporting Documents-

Department of Electrical Engineering

Mapping of Courses to Employability/ Skill Development

Department of Electrical Engineering

IKGPTU Main Campus Kapurthala

Key Indicator – 1.1 Curriculum Design and Development

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

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2021-22

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 across all programs 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	

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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 Developemnt	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)} [BEELAB-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	

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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	

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Name of Department: Electrical Engineering

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

MAPPING POS AND COS

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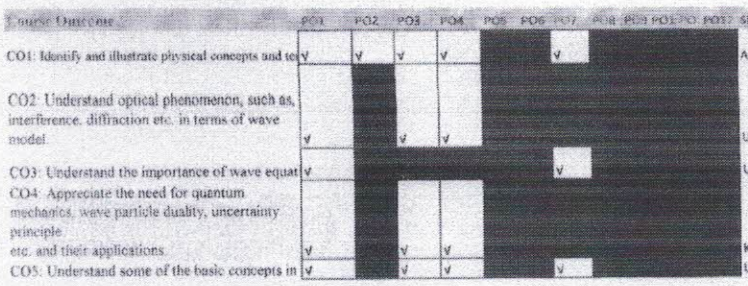
Name of Department: Electrical Engineering **Program: B.Tech Electrical Engineering**

Paper: BTPH102-18 Optics and Modern Physics



Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Identify and illustrate physical concepts and tec	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 equat	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

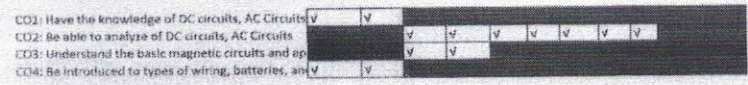
Paper: BTPH112-18 Optics and Modern Physics Lab

Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Verify some of the theoretical concepts la	Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Trained in carrying out precise measureme	Train	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Introduced to the methods used for estim	Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Learn to draw conclusions from data and c	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Write a technical report which communica	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

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

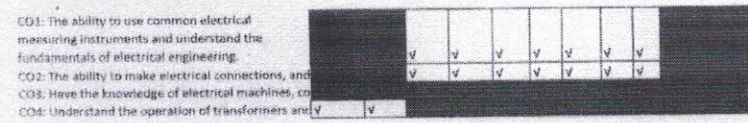
Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: The differential and integral calculus for applic	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: The fallouts of Rolle's Theorem that is fundam	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: The tool of matrices and convergence of seque	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	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 ap	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Be introduced to types of wiring, batteries, an	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-102-18 Basic Electrical Engineering Laboratory

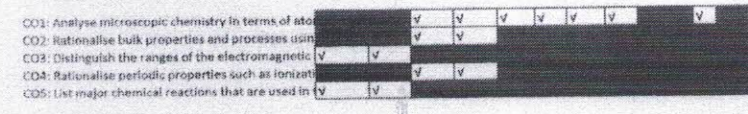


Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: The ability to use common electrical measuring instruments and understand the fundamentals of electrical engineering.	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: The ability to make electrical connections, and	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Have the knowledge of electrical machines, co	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Understand the operation of transformers and	Understand	Yes	Experiments, Viva-Voce, End Semester Exams

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

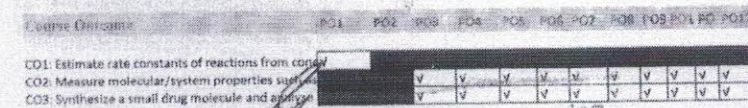
Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To prepare you to design a system, component	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: To prepare you to communicate effectively	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: To prepare you to use the techniques, skills, an	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper:BTCH101-18 Chemistry-I (Theory)



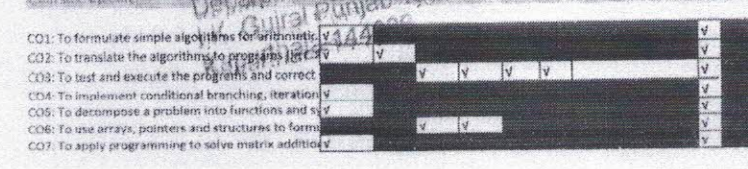
Course Outcome	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Analyse microscopic chemistry in terms of ato	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Rationalise bulk properties and processes usin	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Distinguish the ranges of the electromagnetic	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Rationalise periodic properties such as ionizat	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	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Estimate rate constants of reactions from conc	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 analyze	Ability	Yes	Experiments, Viva-Voce, End Semester Exams

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



Course Outcome	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 s	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

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CO8: To apply programming to solve simple numerical method problems, namely rot finding of function		Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTPS102-18 Programming for Problem Solving (Lab)

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 formulate the algorithms for simple proble	√	√											Apply	Yes	Programming, Viva-Voce, End Semester Exams
CO2: To translate given algorithms to a working and	√	√	√	√									Apply	Yes	Programming, Viva-Voce, End Semester Exams
CO3: To be able to correct syntax errors as reported	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams
CO4: To be able to identify and correct logical errors	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams
CO5: To be able to write iterative as well as recursiv	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams
CO6: To be able to represent data in arrays, strings	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams
CO7: To be able to declare pointers of different type	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams
CO8: To be able to create, read and write to and fro	√	√											Knowledge	Yes	Programming, Viva-Voce, End Semester Exams

Paper: BTMP101-18 Workshop/Manufacturing Practices (Theory & Lab.)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Upon compilation of this laboratory course, stu		√	√	√	√	√	√	√					Ability	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO2: They will also get practical knowledge of the d	√	√											Knowledge	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO3: By assembling different components, they will	√	√									√	√	Learn	Yes	Lab Practice, Viva-Voce, End Semester Exams

Paper: BTHU-101-18 English

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: The objective of the course is to help the stude	√	√										√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Students will acquire basic proficiency in readi										√	√	√	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Students will be able to understand spoken an			√	√	√	√	√	√				√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: They will be able to converse fluently.										√	√	√	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: They will be able to produce on their own clea										√	√	√	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTHU-102-18 (English 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: The objective of the course is to help the stude	√	√										√	Knowledge	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO2: Students will acquire basic proficiency in readi										√	√	√	Ability	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO3: Students will be able to understand spoken an			√	√	√	√	√	√				√	Understand	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO4: They will be able to converse fluently.										√	√	√	Learn	Yes	Lab Practice, Viva-Voce, End Semester Exams
CO5: They will be able to produce on their own clea										√	√	√	Learn	Yes	Lab Practice, Viva-Voce, End Semester Exams

Paper: BTAM202-18 Mathematics-II (Differential Equations & Numerical Methods)

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 methods which can be used to			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: demonstrate knowledge of a range of applicat	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: develop their attitude towards problem solvin			√	√	√	√	√	√	√	√			Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand how to apply numerical methods			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-301-18 Electrical Circuit Analysis

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Apply network theorems for the analysis of ele	√												Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Obtain the transient and steady-state respons		√	√	√	√	√	√	√					Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyze circuits in the sinusoidal steady-state		√	√	√	√	√	√	√					Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Synthesize networks and filters.												√	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE- 302-18 Analog Electronics

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 characteristics of transistors.	√	√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Design and analyse various rectifier and ampli		√	√	√	√	√	√	√					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Design sinusoidal and non-sinusoidal oscillato		√	√	√	√	√	√	√					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the functioning of OP-AMP and de		√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-303-18 Electrical Machines-I

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 magnetic circuits.	√	√	√									√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the operation of DC machines.		√	√									√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Analyse the differences in operation of differe		√	√	√	√	√	√	√				√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Analyse single phase and three phase transfor		√	√	√	√	√	√	√				√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-304-18 Electromagnetic Fields

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 laws of electromagne			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To obtain the electric and magnetic fields for s	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To analyse time varying electric and magnetic			√	√	√	√	√	√					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To understand Maxwell's equation in different			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: To understand the propagation of EM waves.			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-305-18 Engineering Mechanics

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 co-ordinate syster			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse the three-dimensional motion.			√	√	√	√	√	√	√	√			Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO3: Understand the concepts of rigid bodies.	[redacted]	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Analyse the free-body diagrams of different ar		V	V	V	V	V	V	V					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Analyse torsional motion and bending momen		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the use and importance of variou	V	V	V	V	[redacted]								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	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Analyze, take measurements to understand cir		V	V	V	V	V	V	V	V	V		V	Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Troubleshoot, design and create electronic cin	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	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Analyze three-phase transformer/system conf	[redacted]	V	V	V	V	V	V	V					Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Evaluation of equivalent circuit parameters, ef	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					Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Analyze performance characteristics of DC ger		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand working of logic families and logic V	[redacted]	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Design and implement Combinational and Seq 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										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Be able to understand memories.		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the concepts of rotating magnetic	[redacted]	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the operation of AC machines.		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					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To understand the difference between the syn		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the differences between signal lev	[redacted]	V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse controlled rectifier circuits.		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					Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Analyse the operation of voltage source invert		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the concepts of continuous time a V	[redacted]	V	V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse systems in complex frequency domair		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										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand mathematical tools to be able to a 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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Have basics knowledge about measure of cent V	[redacted]	V											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Familiarize the student with expectations of di V		V	V	V									Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Familiarize probability techniques and random V		V	V	V									Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Have basic idea about statistics including corre 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	Apply	Yes	

Paper: BTEE-411-18 Measurements and Instrumentation Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Design and validate DC and AC bridges.	V	V	[redacted]										Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Analyze the dynamic response and the calibra		V	V	V	V	V	V	V					Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Learn about various measurement devices, thi V		V							V	V			Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO4:Understand statistical data analysis.	V		V	V									Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Understand computerized data acquisition.	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To understand of basic electronic components	[redacted]	V	V										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Understanding verify truth tables of TTL gates		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			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			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Testing of basic electronics circuits	V		V	V									Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Construct equivalent circuits induction motors	[redacted]	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					Learn	Yes	Experiments, Viva-Voce, End Semester Exams
CO3:Construct equivalent circuits of synchronous ge		V	V	V	V	V	V	V					Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
													Apply	Yes	Experiments, Viva-Voce, End Semester Exams

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO5:Construct characteristic curves for induction ar		√	√	√	√	√	√	√					Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO6:Understand the concept of parallel operation o		√	√										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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the properties and characteristics : V	√	√	√										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO2:Understand the different types of waveforms c V	√	√	√										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO3:Analyze speed and direction control of single p		√	√	√	√	√	√	√	√		√		Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO4:Understand the effect of free-wheeling diode c		√	√										Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO5:Check the performance of a choppers, and inve 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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:understand the different dimensions of Indian		√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:They will be aware about their duties towards	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Students will be able to challenges of the dem		√	√								√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Ability to understand connect up and explain b		√	√								√		Understand		Mid-Term Tests, Tutorials, End Semester Exams
CO2: Ability to understand connects up and explain		√	√								√		Understand		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the concepts of power systems		√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the various power system compon		√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Evaluate fault currents for different types of fa	√	√	√	√	√	√	√	√	√		√		Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the generation of over-voltages ar			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand basic protection schemes.			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO6:Understand concepts of HVDC power transmis			√	√									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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the modelling of linear-time-invari	√	√	√	√							√		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.	√	√	√	√							√		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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Study of 8085 and 8086 Microprocessors.	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Do assembly language programming.			√	√	√	√	√	√	√		√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Do interfacing design of peripherals like 8255,			√	√	√	√	√	√	√		√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Develop systems using different microprocess			√	√	√	√	√	√	√		√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To Understand the basic concepts of materials.	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To use simplified materials selection concepts	√	√	√	√									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:To Understand the properties of Materials.	√	√	√	√									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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand power system protection.	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the main components used in pow	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the bus bars, overhead and underg	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the earthing protection.	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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Paper: BTEE-504C-18 Electrical Machine Design

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

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Paper: BTEE-504D-18 Renewable Energy Sources

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Students will enable to understand environme	[redacted]		√	√	[redacted]								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:The students will gain practical knowledge by	√	√	[redacted]										Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:The students will apply interdisciplinary appro	√	[redacted]											Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Reflect critically about their roles and identitie	[redacted]									√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course c	[redacted]		√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1 Hands-on experiments related to the course c	[redacted]		√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course c	[redacted]		√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:exposure to the practical aspects of the discipli	√	√	√	√	√	√	√	√	√	√	√	√	Ability	Yes	Hands on Practice, Viva-Voce, End Semester Exams
CO2:work on a specified task	√	√	√	√	√	√	√	√	√	√	√	√	Ability	Yes	Hands on Trianing, 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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Use numerical methods to analyze a power sys	√	[redacted]											Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand stability constraints in a synchrono	[redacted]		√	√	[redacted]	√	√	[redacted]			√	√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand methods to control the voltage, fr	[redacted]		√	√	[redacted]	√	√	[redacted]			√	√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the monitoring and control of a po	[redacted]		√	√	[redacted]	√	√	[redacted]			√	√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand the basics of power system econo	[redacted]		√	√	[redacted]	√	√	[redacted]			√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the load curves, load-duration Cur	[redacted]		√	√	[redacted]								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the power plant economics and ta	[redacted]		√	√	[redacted]								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Explore the significance of economic operation	[redacted]	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the hydro-thermal coordination.	[redacted]		√	√	[redacted]								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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the practical issues related to prac	√	√	√	√	√	√	√	√	√	√	√	√	Understand	Yes	Hands on work, Viva-Voce, End Semester Exams
CO2:Choose appropriate components, software an	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Hands on work, Viva-Voce, End Semester Exams
CO3:Design a Printed Circuit Board, get it made and	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Hands on work, Viva-Voce, End Semester Exams
CO4 Work as a team with other students to implem	√	√	√	√	√	√	√	√	√	√	√	√	Comprtition	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Hands-on and computational experiments rela	[redacted]		√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-621-18 Project -1

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Apply and verify basic scientific principals and	√	[redacted]	√	√	√	√	√	√	√	[redacted]			Apply	Yes	Hands on work, Viva-Voce, End Semester Exams
CO2:Identify the scope of interdisciplinary knowled	[redacted]	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Hands on work, Viva-Voce, End Semester Exams
CO3:Make and design a prototype which is preferat	√	√	√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Analyse transmission lines and estimate voltag	[redacted]		√	√	√	√	√	√	√	[redacted]			Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Provide solution to real life plane wave proble	[redacted]		√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Analyse the field equations for wave propagati	[redacted]		√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Visualize TE and TM mode patterns of field dis	√	√	[redacted]										Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand and analyse radiation by antennas	[redacted]		√		[redacted]								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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the problem of power system stab	[redacted]		√	√	[redacted]								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse linear dynamical systems and use of n	[redacted]		√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Model different power system components fo	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the need and plan the methods to	[redacted]		√	√	[redacted]								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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO

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CO1:Understand the characteristics of dc motors an — Understand — Yes — Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the principles of speed control of d — Understand — Yes — Mid-Term Tests, Tutorials, End Semester Exams
CO3:Apply the knowledge of power electronics to d — Apply — Yes — Mid-Term Tests, Tutorials, End Semester Exams
CO4:Apply the knowledge of control system for the — Apply — Yes — Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand the working of AC and DC drives — 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				√	√								Undestand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the basic physics of wind and solar				√	√								Undestand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Apply the knowledge of electrical machines to	√	√											Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the power electronic interfaces for				√	√								Undestand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand the issues related to the grid integ				√	√								Undestand	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			√	√						√			Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of generation and measurement of	√	√								√			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Knowledge of tests on H. V. equipment and on	√	√								√			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Knowledge of how over-voltages arise in a pow	√	√								√			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			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the reliability modeling and analys			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Knowledge of reliability assessment for elemen	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the risk analysis in power system p			√	√									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.		√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the operation of line-commutated		√	√										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the operation of PWM rectifiers –		√	√										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			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the refrigeration and air condition			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Knowledge of light source, choice of lighting, l	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the diesel generating system and e			√	√									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 technica	√	√								√	√	√	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 technica	√	√								√	√	√	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 technica	√	√								√	√	√	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 technica	√	√								√	√	√	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 technica	√	√								√	√	√	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 technica	√	√								√	√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-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-invari			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understanding state space representations			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Knowledge of the concept of stability	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Assessment for linear-time invariant systems.	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Knowledge of non-linear systems	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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Paper: OEE-102-18 Power Electronics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of power semiconductor switches	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the working of various types of con			√	√									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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of the energy conservation/saving	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of energy conservation opportuniti	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the Demonstrate skills required fo			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the Suggest cost-effective measur			√	√									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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of the basic properties of different	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of the main elements of technical s	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the advantages and disadvantages			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the energy potential of renewable			√	√									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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Summarize the basics of Single-Phase Machine	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Acquire knowledge about testing and applicati	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the concepts of Steeper Motors, co			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the basic concept of DC Machines			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Explain the basic concepts of universal and rep	√	√								√	√	√	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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the electrical wiring systems for re			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand various components of industrial			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Analyze and select the proper size of various el			√	√	√	√	√	√	√	√	√	√	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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the energy scenario and the conse			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the basic physics of wind and solar			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the power electronic interfaces for			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the issues related to the solar tech			√	√									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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Awareness of supply system	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understanding of the material used and constr			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Enable the students to do analysis of power tra			√	√	√	√	√	√	√	√	√	√	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the cables used in power system			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Knowledge of neutral grounding	√	√											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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Apply and verify basic scientific principals and	√												Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2:Application of interdisciplinary knowledge	√	√											Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO3:To identify possible product that can be made			√	√	√	√	√	√	√	√	√	√	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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the current energy scenario and in			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the methods of improving energy			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the concepts of different energy a			√	√									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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To introduce computer applications in the anal	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To understand the solution methods and techn			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:To solve numerically the complex IEEE bus net			√	√	√	√	√	√	√	√	√	√	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	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To introduce the fundamental concepts relevai	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To enable the students to understand the facto			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:To provide basic understanding of the emergin			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:To enable students to design power electronic			√	√	√	√	√	√	√	√	√	√	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	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 ene			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Compare the different strategies related to ene	√	√	√	√	√	√	√	√	√				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	PO1	PO	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 com			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Apply the techniques to simple real-life proble	√												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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To understand the working of a microprocesso			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To learn configuring and using different periph			√	√	√	√	√	√	√	√	√	√	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	PO1	PO	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	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Design controllers using the state-space appro	√	√	√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To impart knowledge about distributed genera	√	√											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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the electrical wiring systems for re	√	√	√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand various components of industrial e			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Analyze and select the proper size of various el			√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To impart knowledge about the restructuring p	√	√											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			√	√									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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the operation of power electronic			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the vector control strategies for ac			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the implementation of the control			√	√									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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Understand the different possible ways of ene			√	√									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the different strategies related to													Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Link the real-life examples with various industr	√	√	√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:															

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Paper: BTEE-801-18 Smart Grids

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO	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 distr	√	√	√	√									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Realize the distribution generation and smart d	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: know the regulations and market models for s	√	√	√	√									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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO

CO1:Demonstrate knowledge of the building blocks	√	√	[redacted]										Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Develop intelligent algorithms for constraint sa	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Attain the capability to represent various real l	[redacted]		√	√	√	√	√	√	√	√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:To know various definitions used in indian elec	√	√	[redacted]										Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:how to get a new connection and enhancemen	√	√	√	√	[redacted]								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Authority and responsibility associated with po	[redacted]									√	√	√	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	PO1	PO	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:Design of primary and secondary transmission	√	√	√	√	√	√	√	√	√	√	√	√	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2:To distinguish power flows and conversion syst	√	√	√	√	[redacted]								Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

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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 on	Assessment Tools to Measure Attainment of CO
CO1: To calculate voltage phasors at all buses , given the data	√	√					√	√	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Able to calculate fault currents in each phase							√	√	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Rank various contingencies according to their sever	√						√	√	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			√				√	√	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Estimate closeness to voltage collapse and calculate PV curves using continuation power flow			√				√	√	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 on	Assessment Tools to Measure Attainment of CO
CO1:Understand the modeling of synchronous machine in de	√								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Carry out simulation studies of power system dynamics		√	√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Carry out stability analysis with and without power syste		√	√						Identify	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the load modeling in power system	√								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 on	Assessment Tools to Measure Attainment of CO
CO1:Knowledge about renewable energy	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the working of distributed generation syster	√								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 on	Assessment Tools to Measure Attainment of CO
CO1:Appreciate the difference between smart grid & convent	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Apply smart metering concepts to industrial and comme	√								Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Formulate solutions in the areas of smart substations, distributed	√		√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Come up with smart grid solutions using modern communicatio	√		√						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 on	Assessment Tools to Measure Attainment of CO
CO1:Learn the characteristics of PSDs such as SCRs, GTOs, IGB	√								Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of working of multi-level VSIs, DC-DC switche	√		√						Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Acquire knowledge of power conditioners and their appl	√	√							Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Ability to design power circuit and protection circuit of P	√			√					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 on	Assessment Tools to Measure Attainment of CO
CO1:Appreciate the importance of energy growth of the pow	√	√							Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Demonstrate the knowledge of the physics of wind pow	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Demonstrate the knowledge of physics of solar power g	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Identify, formulate and solve the problems of energy crises using	√	√							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 on	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of power distribution system	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Study of Distribution automation and its application in po	√		√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: 3.To learn SCADA system	√	√	√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Knowledge about vector spaces, linear transformation, e	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:2.To learn about linear programming problems and understandin	√	√							Investigation	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:3.Acquire knowledge about nonlinear programming and	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understanding the concept of random variables, functions of ran	√	√							Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand stochastic processes and their classification		√	√						Identificaion	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 on	Assessment Tools to Measure Attainment of CO
CO1:Appreciate importance of PWM techniques	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Implement PWM using different strategies		√	√						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Control CSI and VSI using PWM		√	√						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Compare performance of converter for different PWM te		√	√						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 on	Assessment Tools to Measure Attainment of CO
CO1:Acquire knowledge about fundamental concepts, princip	√	√	√	√					Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To learn electric drive in vehicles / traction	√	√	√						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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Paper: MTRM-101-18 RESEARCH METHODOLOGY AND IPR

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus or	Assessment Tools to Measure Attainment of CO
CO1:Understand research problem formulation. Analyze rese	√								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Follow research ethics			√						Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand that today's world is controlled by Compute	√								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:4.Understanding that when IPR would take such importa	√								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: EEPS-105-18 POWER SYSTEM STEADY STATE ANALYSIS LAB

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

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

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

Paper: EEPS-106B-18 RENEWABLE ENERGY LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus or	Assessment Tools to Measure Attainment of CO
CO1:Various power curves considering different renewable s	√					√		√	Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO2:Analyze the effect of variations of parameters on solar p		√	√			√		√	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO3:Analyze the wind power		√	√			√		√	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 or	Assessment Tools to Measure Attainment of CO
CO1:Improve writing and readability levels for English	√				√			√	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:How to write and what write according to section	√				√			√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Skills in title writing	√				√			√	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 or	Assessment Tools to Measure Attainment of CO
CO1:Know, how to reduce disaster risk and humanitarian res	√						√		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Policy and practice for disaster risk reduction	√						√		Challenge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Understand the practical relevance of conflict situations	√		√				√		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Planning, programming and strength and weakness of di	√	√	√				√		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 or	Assessment Tools to Measure Attainment of CO
CO1:Understanding basic Sanskrit language	√							√	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Ancient Sanskrit literature about science & technology c								√	Challenge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Being a logical language will help to develop logic in stu							√	√	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 or	Assessment Tools to Measure Attainment of CO
CO1:Knowledge of self-development	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Learn the importance of Human values	√						√	√	Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Developing the overall personality	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

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

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

Paper: EEPS-203A-18 RESTRUCTURED POWER SYSTEMS

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

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Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO3:Define and describe the Technical and Non-technical issu	√					√	√		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 th	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Knowledge about the time domain and frequency domai	√							√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Study the design techniques for IIR and FIR filters and th	√		√	√				√	Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Acquire knowledge about the finite word length effects i	√				√			√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Knowledge about the various linear signal models and e	√							√	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: EEPS-203C-18 DYNAMICS OF ELECTRICAL MACHINES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Formulation of electro-dynamic equations of all electric		√	√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Knowledge of transformations for the dynamic analysis	√								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: EEPS-203D-18 POWER APPARATUS DESIGN

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:To give a systematic approach for modeling and analysis	√	√	√	√	√	√			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2:2 Ability to model and design all types of rotation machines including special machines	√	√	√	√	√	√			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:A processor in assembly language and develop an advan	√	√	√		√	√			Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To learn configuring and using different peripherals in a	√	√	√	√	√	√			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: EEPS-204B-18 SCADA SYSTEMS AND APPLICATIONS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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 a	√	√	√		√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Knowledge about single unified standard architecture IE	√				√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:To learn about SCADA system components: remote term	√				√				Utilization	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Learn and understand about SCADA applications in trans	√				√				Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEPS-204C-18 POWER QUALITY

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

Paper: EEPS-204D-18 ARTIFICIAL INTELLIGENCE TECHNIQUES

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

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

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

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Paper: EEPS-205B-18 POWER QUALITY LAB

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

Paper: EEPS-206A-18 ARTIFICIAL INTELLIGENCE LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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: EEPS-206B-18POWER ELECTRONICS APPLICATIONS TO POWER SYSTEMS LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO

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Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on Assessment Tools to Measure Attainment of CO		
CO1:Understand and analyze the performance of converters	√	√	√		√	√			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams	
CO2:Performance analysis of drive		√	√		√	√			Analysis	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 on Assessment Tools to Measure Attainment of CO		
CO1:To understand structure of smart grid and micro grid	√				√	√			Understand	Yes	Experiments, Viva-Voce, End Semester Exams	
CO2:Power quality issues for grid connected renewable sourc	√	√	√		√	√			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 on Assessment Tools to Measure Attainment of CO		
CO1:Discuss the growth of the demand for civil rights in India	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Discuss the intellectual origins of the framework of argu	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:Discuss the circumstances surrounding the foundation of	√						√	√	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO4:Discuss the passage of the Hindu Code Bill of 1956.	√						√	√	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 on Assessment Tools to Measure Attainment of CO		
CO1:What pedagogical practices are being used by teachers i	√					√			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:What is the evidence on the effectiveness of these peda	√					√			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:3.How can teacher education (curriculum and practicum) 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 on Assessment Tools to Measure Attainment of CO		
CO1:Develop healthy mind in a healthy body thus improving	√					√			Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Improve efficiency	√					√			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 on Assessment Tools to Measure Attainment of CO		
CO1:Study of Shrimad-Bhagwad Geeta will help the student i	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:The person who has studied Geeta will lead the nation a	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:Study of Neetishatakam will help in developing versatile personality of students.	√								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 on Assessment Tools to Measure Attainment of CO		
CO1:Knowledge of various transients that could occur in pow	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Ability to design various protective devices in power syst	√	√	√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:Coordinating the insulation of various equipments in pov							√		Coordination	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO4:Modelling the power system for transient analysis				√					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 on Assessment Tools to Measure Attainment of CO		
CO1:1.Acquire knowledge about the fundamental principles o	√								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:2.Learn various Static VAR Compensation Schemes like T	√	√							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.	√	√	√	√					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 on Assessment Tools to Measure Attainment of CO		
CO1:Knowledge about load control techniques in industries a	√				√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Learn different types of industrial processes and optimiz	√				√				Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:Apply load management to reduce demand of electricity	√	√	√		√				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO4:Apply different energy saving opportunities in industries	√	√	√		√				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 on Assessment Tools to Measure Attainment of CO		
CO1:To learn linear system modeling, analysis and design so	√				√				Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Knowledge on carrying out detailed stability analysis of l	√				√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO3:Design observers and controllers for linear systems		√	√	√	√				Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO4: Acquire knowledge of discrete time linear systems mod	√				√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO5: 5.Develop and utilize modern software tools for analysis and design of linear continuous and discrete time systems						√	√		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 on Assessment Tools to Measure Attainment of CO		
CO1:Students will demonstrate knowledge of data analytics.	√	√	√						Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams	
CO2:Students will demonstrate the ability of think critically in	√	√	√						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams	

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CO3:Students will demonstrate the ability to use technical ski	√	√	√								Identify	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:4.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 on	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 maintenanc	√		√		√		√		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 OPERATIONSRESEARCH

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Students should able to apply the dynamic programming	√				√				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Students should able to apply the concept of non-linear	√				√				Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Students should able to carry out sensitivity analysis	√	√	√		√				Analysis	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Students should 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 on	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 on	Assessment Tools to Measure Attainment of CO
CO1:Learn about composite materials and their process of re	√								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 on	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 ene	√						√		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Know about biomass waste properties	√						√		Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Gagandeep

(Signature of Head of Department)

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Name of Department: Electrical Engineering

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

MAPPING POS AND COS

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Name of Department: Electrical Engineering

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

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

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 planning and operational issues related to Distributed Generation.	√		√						Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Analyse the impact of Distributed Generation		√	√						Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the Micro-Grids	√		√						Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Analyse the micro-grids		√							Analysis	Yes	Mid-semester tests, Assignments, End-semester examination

PSRE-103A/21
FACTS AND CUSTOM POWER DEVICES

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: Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission and Distribution level in Power Systems.	√	√							Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.	√	√							Learning	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Reactive Power Systems, PWM Inverter based Reactive Power Systems and their controls.		√			√				Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.			√		√				Analyse	Yes	Mid-semester tests, Assignments, End-semester examination

PSRE-103B/21
ADVANCED POWER SYSTEMS PROTECTION

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 about classification and operation of static relays.	√			√					Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination

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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	**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: Knowledge about vector spaces, linear transformation, eigenvalues and eigenvectors of Linear operators	√								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
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	**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: Develop a systematic approach AC-DC converters		√							Application	Yes	Mid-semester tests, Assignments, End-semester examination
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	**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 concept of Solar Radiation Geometry.	√								Understand	Yes	Mid-semester tests, Assignments, End-semester examination
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	**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**

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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**	**PC 6**	**PO 7**	**PO 8**	**Skill**	**Focus**	**Assessment tools to measure attainment of CO**

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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**
CO1: 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 practicefrom multiple perspectives.			√			√			Evaluate	Yes	Mid-semester tests, Assignments, End-semester examination

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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											
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 get a working knowledge in illustrious Sanskrit, the scientific language in the world				√					Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Learning of Sanskrit to improve brain functioning				√					Application		Mid-semester tests, Assignments, End-semester examination
CO3: Learning of Sanskrit to develop the logic in mathematics, science & othersubjects enhancing the memory power.	√		√						Application	Yes	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											
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 value of education and self- development						√			knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Imbibe good values in students						√			Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Let the should know about the importance of character						√			Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-201/21 ENERGY FORECASTING AND MODELING											
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: Interpret the Energy & GDP, GNP and its dynamics	√								Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Develop energy system models for short term and long-term forecasting		√			√				Synthesis	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge about different Energy Sources	√								Knowledge	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											
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 study the unit commitment problem for economic load dispatch.	√	√							Learn	Yes	Mid-semester tests, Assignments, End-semester examination

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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											
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 significance of power quality and power quality parameters.			√						Understand	Yes	Mid-semester tests, Assignments, End-semester examination
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.								√	Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: To understand different compensation techniques to minimize power quality disturbances.	√							√	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203B/21 POWER SYSTEM DYNAMICS											
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 modeling of synchronous machine in details	√								Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Development of mathematical models for synchronous machine		√	√						Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Analysis and physical interpretation of models of Synchronous machine		√	√						Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Modeling of induction motor and Understand the load modeling in power system.		√	√						Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-203C/21 RELIABILITY ANALAYSIS AND PROTECTION											
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: Have knowledge of different methods to estimate different electrical quantities	√								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
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.			√						Application	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understand about modes of failure and calculate relevant indices.			√					√	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**

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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 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: Know the concept of electric vehicles and hybrid electric vehicles.	√				√				Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Familiar with different motors used for hybrid electric vehicles.	√				√				Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the power converters used in hybrid electric vehicles	√				√				Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Know different batteries and other energy storage systems.	√				√				Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204B/21 SMART GRIDS											
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 concept of smart grid and developments on smart grid.	√	√							Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Understand smart grid technologies and application of smart grid concept in hybrid electric vehicles.	√	√							Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Have knowledge on smart substations, feeder automation and	√								Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of monitoring and protection of grid.	√		√						Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204C/21 ENGINEERING OPTIMIZATION											
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 need for optimization and different techniques involved and also constraints.	√				√				Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of Linear/Non-linear Programming.					√				Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the importance of optimization to solve Engineering problems					√			√	Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of genetic algorithm for Engineering Optimization					√				Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-204D/21 ARTIFICIAL INTELLIGENCE TECHNIQUES											

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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

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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 ofnation hood 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 BolshevikRevolution 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											
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: Review existing evidence on the review topic to inform programme design and policymaking undertaken by the DfID, other agencies and researchers.				√				√	Analysis	Yes	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											
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 achieve overall health of body and mind				√				√	Application	Yes	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											
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 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				√		√			Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-301A/21 INDUSTRIAL LOAD MODELING AND CONTROL											
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: Knowledge about load control techniques in industries and its application.	√								Knowledge	Yes	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

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PSRE-301B/21 POWER SYSTEM DEREGULATION											
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: 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 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 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 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: 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 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 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

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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: Mange 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 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 about industrial safety and maintenance engineering			√	√					Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Learn possible ways of prevention from wear and tear and methods of fault tracing			√	√					Learning	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand periodic maintenance			√	√					Understand	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301C/21 OPERATIONS RESEARCH											
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 learn the optimization techniques	√								learn	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: How to formulate LPP and handling of Nonlinear programming					√				Synthesise	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: How to do the scheduling and sequencing of models		√							Application	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301D/21 COST MANAGEMENT OF ENGINEERING PROJECTS											
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 get knowledge about cost concept and cost management process				√					Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
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				√					Leaning	Yes	Mid-semester tests, Assignments, End-semester examination
MTOE-301E/21 COMPOSITE MATERIALS											
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**

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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	**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 classification of waste and about energy from waste	√		√						Understand	Yes	Mid-semester tests, Assignments, End-semester examination
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

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

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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

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	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**

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

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

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