

Department of Electrical Engineering

IKGPTU Main Campus Kapurthala

Key Indicator – 1.1 Curriculum Design and Development

1.1.3 Q_nM	<i>Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the University</i> 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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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	

Power System Deregulation	PSRE-301B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Solar PV Energy System	PSRE-301C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Energy Storage System	PSRE-301D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Business Analysis	MTOE-301A/21	2021	Mid-semester tests, Assignments, End-semester examination	
Industrial Safety	MTOE-301B/21	2021	Mid-semester tests, Assignments, End-semester examination	
Operations Research	MTOE-301C/21	2021	Mid-semester tests, Assignments, End-semester examination	
Cost Management of Engineering Projects	MTOE-301D/21	2021	Mid-semester tests, Assignments, End-semester examination	
Composite Materials	MTOE-301E/21	2021	Mid-semester tests, Assignments, End-semester examination	
Phase-I Dissertation	PSRE-302/21	2021	Project assigned, writing and presentation of work	
Phase-II Dissertation	PSRE-401/21	2021	Project assigned, writing and presentation of work	
Chemistry	BTCH101-18	2018	Mid-semester tests, Assignments, End-semester examination	
Chemistry (Lab)	BTCH102-18,	2018	Mid-semester tests, Assignments, End-semester examination	
Maths-2	BTAMXX-18,	2018	Mid-semester tests, Assignments, End-semester examination	
Prog. For Problem Solving	BTPS101-18	2018	Mid-semester tests, Assignments, End-semester examination	
Prog. For Problem Solving (Lab)	BTPS102-18	2018	Mid-semester tests, Assignments, End-semester examination	
Workshop & Manufacturing Practice	BTMP101-18	2018	Mid-semester tests, Assignments, End-semester examination	
English	BTHU101-18	2018	Mid-semester tests, Assignments, End-semester examination	
English Lab	BTHU102-18	2018	Mid-semester tests, Assignments, End-semester examination	
Mentoring and professional Development	BMPD201-18	2018	Mid-semester tests, Assignments, End-semester examination	
Physics {PHY (L) }	BTPHXX-18	2018	Mid-semester tests, Assignments, End-semester examination	
Physics Lab {PHY (P)} [PHYLAB-1]	BTPHXX-18	2018	Lab work and experiments, End-semester examination	
Maths-I {MATHS (L)}	BTAMXX-18	2018	Mid-semester tests, Assignments, End-semester examination	
Basic Electrical Engineering {BEE (L)}	BTEE101-18	2018	Mid-semester tests, Assignments, End-semester examination	
Basic Electrical Engineering Lab {BEE (P)} [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	

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

Name of Department: Electrical Engineering

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

MAPPING POS AND COS


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Name of Department: Electrical Engineering

Program: B.Tech Electrical Engineering

Paper: BTPH102-18 Optics and Modern Physics

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Identify and illustrate physical concepts and theories	✓	✓	✓	✓			✓						Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand optical phenomenon, such as, interference, diffraction etc. in terms of wave model.	✓		✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the importance of wave equation	✓						✓						Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Appreciate the need for quantum mechanics, wave particle duality, uncertainty principle etc. and their applications.	✓		✓	✓									Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Understand some of the basic concepts in	✓		✓	✓			✓						Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTPH112-18 Optics and Modern Physics Lab

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Verify some of the theoretical concepts in lab	✓		✓		✓	✓	✓	✓					Apply	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: Trained in carrying out precise measurements	✓		✓		✓	✓	✓	✓					Train	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: Introduced to the methods used for estimation	✓		✓		✓	✓	✓	✓					Understand	Yes	Experiments, Viva-Voce, End Semester Exams
CO4: Learn to draw conclusions from data and graphs	✓		✓		✓	✓	✓	✓					Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO5: Write a technical report which communicates	✓		✓		✓	✓	✓	✓					Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: The differential and integral calculus for applications	✓		✓		✓		✓						Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: The fallouts of Rolle's Theorem that is fundamental	✓		✓	✓	✓		✓						Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: The tool of matrices and convergence of sequences	✓		✓				✓						Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: The tools of differentiation and integration of	✓		✓				✓						Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-101-18 Basic Electrical Engineering

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Have the knowledge of DC circuits, AC Circuits	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Be able to analyze of DC circuits, AC Circuits		✓	✓	✓	✓	✓	✓	✓	✓	✓			Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the basic magnetic circuits and applications			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Be introduced to types of wiring, batteries, and	✓	✓											Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-102-18 Basic Electrical Engineering Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
EO1: The ability to use common electrical measuring instruments and understand the fundamentals of electrical engineering.			✓	✓	✓	✓	✓	✓	✓	✓			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
EO2: The ability to make electrical connections, and			✓	✓	✓	✓	✓	✓	✓	✓			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
EO3: Have the knowledge of electrical machines, components			✓	✓	✓	✓	✓	✓	✓	✓			Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
EO4: Understand the operation of transformers and	✓	✓											Understand	Yes	Experiments, Viva-Voce, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To prepare you to design a system, components	✓		✓	✓	✓	✓	✓	✓	✓	✓			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams
CO2: To prepare you to communicate effectively											✓		Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams
CO3: To prepare you to use the techniques, skills, and	✓		✓	✓	✓	✓	✓	✓	✓	✓			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTCH101-18 Chemistry-I (Theory)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Analyse microscopic chemistry in terms of atomic structure			✓	✓	✓	✓	✓	✓				✓	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Rationalise bulk properties and processes using			✓	✓	✓	✓	✓	✓					Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Distinguish the ranges of the electromagnetic spectrum	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Rationalise periodic properties such as ionization energy			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: List major chemical reactions that are used in	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Estimate rate constants of reactions from concentration vs. time data			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: To formulate simple algorithms for arithmetic operations	✓												Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To translate the algorithms to programs in C/C++	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To test and execute the programs and correct errors			✓	✓	✓	✓	✓						Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To implement conditional branching, iteration	✓												Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: To decompose a problem into functions and sub-problems	✓												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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Paper: BTEE-311-18 Analog Electronics Laboratory

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

Paper: BTEE-401-18 Digital Electronics

Paper: BTEE-402-18 Electrical Machines – II

Paper: BTEE-403-18 Power Electronics

Paper: BTEE-404-18 Signals and Systems

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

Paper: BTEE-411-18 Measurements and Instrumentation Laboratory

Paper: STEE-412-18 Digital Electronics Laboratory

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

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

Paper: BTEE-414-18 Power Electronics Laboratory

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

Paper: BTMC-102-18 Indian Constitution

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

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

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

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

BEE-301-15 Power systems / Applications													Focus Assessment Tools to Measure Attainment of CO		
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill			
CO1:Understand the concepts of power systems.			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the various power system compon			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Evaluate fault currents for different types of fa	V	V	V	V	V	V	V	V	V	V	V	V	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Understand the generation of over-voltages an			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5:Understand basic protection schemes.			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO6:Understand concepts of HVDC power transmiss			V	V									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-502-18 Control Systems

Paper: BTEE-502-18 Control Systems													Focus: Assessment Tools to Measure Attainment of CO		
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Skill			
CO1:Understand the modelling of linear-time-invariant systems.	✓	✓	✓	✓							✓		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand the concept of stability and its assessment for linear-time invariant systems.			✓	✓								✓	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
Design simple feedback controllers.			✓	✓											

Paper: BTEE-503-18 Microprocessors

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

Paper: BTEE-504A-18 Electrical Engineering Materials

Paper: BTEE-504A-16 Electrical Engineering													Focus	Assessment Tools to Measure Attainment of CO	
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill		
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

Paper: BTEE-504B-18 Switchgear and Protection														Focus Assessment Tools to Measure Attainment of CO		
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill			
CO1: Understand power system protection.	✓	✓	✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the main components used in power system protection.	✓	✓	✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the bus bars, overhead and underground transmission lines.	✓	✓	✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the earthing protection.	✓	✓	✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Head
Department of Electrical Engineering

Paper: BTEE-504D-18 Electrical Machine Design

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

Paper: BTEE-504D-18 Renewable Energy Sources

Paper: BTEE-504D-18 Renewable Energy Source													Department of Electrical Engineering		Focus		Assessment Tools to Measure Attainment of CO	
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill					
CO1:To understand the Need, importance and scope			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams		
CO2:To understand role significance of solar energy			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams		
CO3:To provide importance of Wind Energy.	V	V	V	V	V	V	V	V	V	V	V	V		Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams		
CO4:To understand the role of ocean energy in the			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams		
CO5:To get the utilization of Biogas plants and geot			V	V	V	V	V	V	V	V	V	V		Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams		
CO6:To understand the concept of energy Conserva			V	V										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams		

Paper: EV5-101-18 Environmental Studies

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
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CO1:Students will enable to understand environment			V	V		Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:The students will gain practical knowledge by	V	V				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:The students will apply interdisciplinary approach	V					Apply	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:Reflect critically about their roles and identities					V	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SRB	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course of		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-512-18 Control Systems Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	SB	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course content		☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-513-18 Microprocessors Laboratory

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on experiments related to the course content		v	v	v	v	v	v	v	v	v	v	v	Analyze		Experiments, Viva-Voce, End Semester Exams

Paper: BTEE-521-18 Summer Industry Internship

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36	PO37	PO38	PO39	PO40	PO41	PO42	PO43	PO44	PO45	PO46	PO47	PO48	PO49	PO50	PO51	PO52	PO53	PO54	PO55	PO56	PO57	PO58	PO59	PO60	PO61	PO62	PO63	PO64	PO65	PO66	PO67	PO68	PO69	PO70	PO71	PO72	PO73	PO74	PO75	PO76	PO77	PO78	PO79	PO80	PO81	PO82	PO83	PO84	PO85	PO86	PO87	PO88	PO89	PO90	PO91	PO92	PO93	PO94	PO95	PO96	PO97	PO98	PO99	PO100	PO101	PO102	PO103	PO104	PO105	PO106	PO107	PO108	PO109	PO110	PO111	PO112	PO113	PO114	PO115	PO116	PO117	PO118	PO119	PO120	PO121	PO122	PO123	PO124	PO125	PO126	PO127	PO128	PO129	PO130	PO131	PO132	PO133	PO134	PO135	PO136	PO137	PO138	PO139	PO140	PO141	PO142	PO143	PO144	PO145	PO146	PO147	PO148	PO149	PO150	PO151	PO152	PO153	PO154	PO155	PO156	PO157	PO158	PO159	PO160	PO161	PO162	PO163	PO164	PO165	PO166	PO167	PO168	PO169	PO170	PO171	PO172	PO173	PO174	PO175	PO176	PO177	PO178	PO179	PO180	PO181	PO182	PO183	PO184	PO185	PO186	PO187	PO188	PO189	PO190	PO191	PO192	PO193	PO194	PO195	PO196	PO197	PO198	PO199	PO200	PO201	PO202	PO203	PO204	PO205	PO206	PO207	PO208	PO209	PO210	PO211	PO212	PO213	PO214	PO215	PO216	PO217	PO218	PO219	PO220	PO221	PO222	PO223	PO224	PO225	PO226	PO227	PO228	PO229	PO230	PO231	PO232	PO233	PO234	PO235	PO236	PO237	PO238	PO239	PO240	PO241	PO242	PO243	PO244	PO245	PO246	PO247	PO248	PO249	PO250	PO251	PO252	PO253	PO254	PO255	PO256	PO257	PO258	PO259	PO260	PO261	PO262	PO263	PO264	PO265	PO266	PO267	PO268	PO269	PO270	PO271	PO272	PO273	PO274	PO275	PO276	PO277	PO278	PO279	PO280	PO281	PO282	PO283	PO284	PO285	PO286	PO287	PO288	PO289	PO290	PO291	PO292	PO293	PO294	PO295	PO296	PO297	PO298	PO299	PO300	PO301	PO302	PO303	PO304	PO305	PO306	PO307	PO308	PO309	PO310	PO311	PO312	PO313	PO314	PO315	PO316	PO317	PO318	PO319	PO320	PO321	PO322	PO323	PO324	PO325	PO326	PO327	PO328	PO329	PO330	PO331	PO332	PO333	PO334	PO335	PO336	PO337	PO338	PO339	PO340	PO341	PO342	PO343	PO344	PO345	PO346	PO347	PO348	PO349	PO350	PO351	PO352	PO353	PO354	PO355	PO356	PO357	PO358	PO359	PO360	PO361	PO362	PO363	PO364	PO365	PO366	PO367	PO368	PO369	PO370	PO371	PO372	PO373	PO374	PO375	PO376	PO377	PO378	PO379	PO380	PO381	PO382	PO383	PO384	PO385	PO386	PO387	PO388	PO389	PO390	PO391	PO392	PO393	PO394	PO395	PO396	PO397	PO398	PO399	PO400	PO401	PO402	PO403	PO404	PO405	PO406	PO407	PO408	PO409	PO410	PO411	PO412	PO413	PO414	PO415	PO416	PO417	PO418	PO419	PO420	PO421	PO422	PO423	PO424	PO425	PO426	PO427	PO428	PO429	PO430	PO431	PO432	PO433	PO434	PO435	PO436	PO437	PO438	PO439	PO440	PO441	PO442	PO443	PO444	PO445	PO446	PO447	PO448	PO449	PO450	PO451	PO452	PO453	PO454	PO455	PO456	PO457	PO458	PO459	PO460	PO461	PO462	PO463	PO464	PO465	PO466	PO467	PO468	PO469	PO470	PO471	PO472	PO473	PO474	PO475	PO476	PO477	PO478	PO479	PO480	PO481	PO482	PO483	PO484	PO485	PO486	PO487	PO488	PO489	PO490	PO491	PO492	PO493	PO494	PO495	PO496	PO497	PO498	PO499	PO500	PO501	PO502	PO503	PO504	PO505	PO506	PO507	PO508	PO509	PO510	PO511	PO512	PO513	PO514	PO515	PO516	PO517	PO518	PO519	PO520	PO521	PO522	PO523	PO524	PO525	PO526	PO527	PO528	PO529	PO530	PO531	PO532	PO533	PO534	PO535	PO536	PO537	PO538	PO539	PO540	PO541	PO542	PO543	PO544	PO545	PO546	PO547	PO548	PO549	PO550	PO551	PO552	PO553	PO554	PO555	PO556	PO557	PO558	PO559	PO560	PO561	PO562	PO563	PO564	PO565	PO566	PO567	PO568	PO569	PO570	PO571	PO572	PO573	PO574	PO575	PO576	PO577	PO578	PO579	PO580	PO581	PO582	PO583	PO584	PO585	PO586	PO587	PO588	PO589	PO590	PO591	PO592	PO593	PO594	PO595	PO596	PO597	PO598	PO599	PO600	PO601	PO602	PO603	PO604	PO605	PO606	PO607	PO608	PO609	PO610	PO611	PO612	PO613	PO614	PO615	PO616	PO617	PO618	PO619	PO620	PO621	PO622	PO623	PO624	PO625	PO626	PO627	PO628	PO629	PO630	PO631	PO632	PO633	PO634	PO635	PO636	PO637	PO638	PO639	PO640	PO641	PO642	PO643	PO644	PO645	PO646	PO647	PO648	PO649	PO650	PO651	PO652	PO653	PO654	PO655	PO656	PO657	PO658	PO659	PO660	PO661	PO662	PO663	PO664	PO665	PO666	PO667	PO668	PO669	PO670	PO671	PO672	PO673	PO674	PO675	PO676	PO677	PO678	PO679	PO680	PO681	PO682	PO683	PO684	PO685	PO686	PO687	PO688	PO689	PO690	PO691	PO692	PO693	PO694	PO695	PO696	PO697	PO698	PO699	PO700	PO701	PO702	PO703	PO704	PO705	PO706	PO707	PO708	PO709	PO710	PO711	PO712	PO713	PO714	PO715	PO716	PO717	PO718	PO719	PO720	PO721	PO722	PO723	PO724	PO725	PO726	PO727	PO728	PO729	PO730	PO731	PO732	PO733	PO734	PO735	PO736	PO737	PO738	PO739	PO740	PO741	PO742	PO743	PO744	PO745	PO746	PO747	PO748	PO749	PO750	PO751	PO752	PO753	PO754	PO755	PO756	PO757	PO758	PO759	PO760	PO761	PO762	PO763	PO764	PO765	PO766	PO767	PO768	PO769	PO770	PO771	PO772	PO773	PO774	PO775	PO776	PO777	PO778	PO779	PO780	PO781	PO782	PO783	PO784	PO785	PO786	PO787	PO788	PO789	PO790	PO791	PO792	PO793	PO794	PO795	PO796	PO797	PO798	PO799	PO800	PO801	PO802	PO803	PO804	PO805	PO806	PO807	PO808	PO809	PO810	PO811	PO812	PO813	PO814	PO815	PO816	PO817	PO818	PO819	PO820	PO821	PO822	PO823	PO824	PO825	PO826	PO827	PO828	PO829	PO830	PO831	PO832	PO833	PO834	PO835	PO836	PO837	PO838	PO839	PO840	PO841	PO842	PO843	PO844	PO845	PO846	PO847	PO848	PO849	PO850	PO851	PO852	PO853	PO854	PO855	PO856	PO857	PO858	PO859	PO860	PO861	PO862	PO863	PO864	PO865	PO866	PO867	PO868	PO869	PO870	PO871	PO872	PO873	PO874	PO875	PO876	PO877	PO878	PO879	PO880	PO881	PO882	PO883	PO884	PO885	PO886	PO887	PO888	PO889	PO890	PO891	PO892	PO893	PO894	PO895	PO896	PO897	PO898	PO899	PO900	PO901	PO902	PO903	PO904	PO905	PO906	PO907	PO908	PO909	PO910	PO911	PO912	PO913	PO914	PO915	PO916	PO917	PO918	PO919	PO920	PO921	PO922	PO923	PO924	PO925	PO926	PO927	PO928	PO929	PO930	PO931	PO932	PO933	PO934	PO935	PO936	PO937	PO938	PO939	PO940	PO941	PO942	PO943	PO944	PO945	PO946	PO947	PO948	PO949	PO950	PO951	PO952	PO953	PO954	PO955	PO956	PO957	PO958	PO959	PO960	PO961	PO962	PO963	PO964	PO965	PO966	PO967	PO968	PO969	PO970	PO971	PO972	PO973	PO974	PO975	PO976	PO977	PO978	PO979	PO980	PO981	PO982	PO983	PO984	PO985	PO986	PO987	PO988	PO989	PO990	PO991	PO992	PO993	PO994	PO995	PO996	PO997	PO998	PO999	PO1000
CO1:exposure to the practical aspects of the discipline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

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

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

Paper: BTEE-602-18 Power Generation and Economics

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

Paper: BTEE-611-18 Electronics Design Laboratory

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

Paper: BTEE-512-18 Power Systems-II Laboratory

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Hands-on and computational experiments related to the synthesis of organic compounds.		y	y	y	y	y	y	y	y	y	y	y	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	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Apply and verify basic scientific principals and			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Apply	Yes	Hands on work, Viva-Voce, End Semester Exams
CO2: Identify the scope of interdisciplinary knowled		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Hands on work, Viva-Voce, End Semester Exams
CO3: Make and design a prototype which is preferab		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Hands on work, Viva-Voce, End Semester Exams

Paper: 8TEE-603A-18 Electromagnetic Waves

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

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the problem of power system stability		✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Analyse linear dynamical systems and use of state space representation		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Model different power system components for transient analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the need and plan the methods to solve power system problems		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-603C-18 Electrical Drives

[illegible]

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

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

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

Paper: BTEE-604A-18 High Voltage Engineering

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

Paper: BTEE-604B-18 Power System Reliability

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

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

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

Paper: BTEE-604D-18 Energy Efficient Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: Understand the basic electricity billing and ele			√	√									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, li	√	√											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understand the diesel generating system and			√	√									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 technical knowledge	✓	✓									✓	✓	✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

Paper: HSMC-113-18 Values and Ethics

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

Paper: HSMC-124-18 Sanskrit Bhasha

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 technical knowledge with the business and societal context.	V	V											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: HSMC (MME-303) Law and Engineering

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1: students will be able to integrate their technical	V	V											V, V		

Paper: DEE-101-18 Control Systems

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

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Paper: OEE-102-18 Power Electronics

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

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

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

Paper: OEE-104-18 Renewable Energy Sources

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1:Knowledge of the basic properties of different	✓	✓											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

Generic Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Summarize the basics of Single-Phase Machine	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Acquire knowledge about testing and application of Single-Phase Machine	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the concepts of Stepper Motors, dc and ac			✓	✓									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 repulsion motor	✓	✓								✓	✓	✓	Learn	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: OEE-202-18 Industrial Electrical Systems

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

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

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

Paper: OEE-204-18 Power Systems

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Awareness of supply system	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understanding of the material used and construction of power system			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Enable the students to do analysis of power transmission system			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	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	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Apply and verify basic scientific principles and concepts	✓												Apply	Yes	Experiments, Viva-Voice, End Semester Exams
CO2: Application of interdisciplinary knowledge	✓	✓											Knowledge	Yes	Experiments, Viva-Voice, End Semester Exams
CO3: To identify possible product that can be made			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Ability	Yes	Experiments, Viva-Voice, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the current energy scenario and its impact on the environment			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the methods of improving energy efficiency			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Understand the concepts of different energy audit techniques			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: To introduce the fundamental concepts relevant to power quality	✓	✓											Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: To enable the students to understand the factors affecting power quality			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: To provide basic understanding of the emerging power quality issues			✓	✓									Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To enable students to design power electronic devices for power quality improvement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Design	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	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO	
CO1: Understand the conventional vehicles models			✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Understand the different possible ways of energy storage			✓	✓										Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Compare the different strategies related to energy storage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: BTEE-702A-18 Computational Electromagnetics

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

Paper: BTEE-702C-18 Control Systems Design

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

Paper: BTEE-702D-18 Distributed Generation

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

Paper: BTEE-703A-18 Industrial Electrical Systems

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

Paper: BTEE-703B-18 Restructured Power Systems

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

Paper: BTEE-703D-18 Energy Storage System

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

Paper: BTEE-721-18 One Semester Training

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
CO1:														Head	Department of Electrical Engineering

Paper: BTEE-801-18 Smart Grids

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

Paper: BTEE-802-18 Artificial Intelligence Techniques

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Skill	Focus	Assessment Tools to Measure Attainment of CO
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CO1: Demonstrate knowledge of the building blocks	✓	✓																Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2: Develop intelligent algorithms for constraint satisfaction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Analyze	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Attain the capability to represent various real life situations			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Ability	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

Paper: BTEE-811-18 Modelling and Simulation Lab

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	SB	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 systems	✓	✓	✓	✓									Knowledge	Yes	Experiments, Viva-Voce, End Semester Exams

Gurandeep
(Signature of Head of Department)

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

Paper: EEP5-101-18 POWER SYSTEM ANALYSIS-I

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: To calculate voltage phasors at all buses, given the data	✓	✓					✓	✓	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 severity	✓						✓	✓	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: EEP5-102-18 POWER SYSTEM DYNAMICS-I

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Understand the modeling of synchronous machine in de	✓								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 system		✓	✓						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: EEP5-103A-18 RENEWABLE ENERGY SYSTEM

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

Paper: EEP5-103B-18 SMART GRIDS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Appreciate the difference between smart grid & convent	✓								Knowledge	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Apply smart metering concepts to industrial and comm	✓								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 communication		✓	✓						Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-103C-18 HIGH POWER CONVERTERS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Learn the characteristics of PSDs such as SCRs, GTOs, IGBT	✓								Apply	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Knowledge of working of multi-level VSIs, DC-DC switch			✓						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: EEP5-103D-18 WIND AND SOLAR SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Appreciate the importance of energy growth of the pow	✓	✓							Analyze	Yes Mid-Term Tests, Tutorials, End Semester Exams
CO2: Demonstrate the knowledge of the physics of wind powe	✓								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: EEP5-104A-18 ELECTRICAL POWER DISTRIBUTION SYSTEM

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

Paper: EEP5-104-B-18 MATHEMATICAL METHODS FOR POWER ENGINEERING

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Knowledge about vector spaces, linear transformation, e	✓								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		✓	✓						Identification	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-104C-18 PULSE WIDTH MODULATION FOR PE CONVERTERS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Appreciate importance of PWM techniques	✓								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 to		✓	✓						Identification	Yes Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-104-D-18 ELECTRIC AND HYBRID VEHICLES

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus of Assessment Tools to Measure Attainment of CO
CO1: Acquire knowledge about fundamental concepts, princ	✓	✓	✓	✓					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 on	Assessment Tools to Measure Attainment of CO
CO1: Understand research problem formulation. Analyze research	✓								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 Computer	✓								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Understanding that when IPR would take such importance	✓								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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 system	✓	✓	✓	✓	✓	✓		✓	Usage	Yes	Experiments, Viva-Voce, End Semester Exams

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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: EEP5-106B-18 RENEWABLE ENERGY LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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 on	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 on	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 d	✓	✓	✓				✓		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 on	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 o								✓	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 on	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: EEP5-201-18 DIGITAL PROTECTION OF POWER SYSTEM

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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: EEP5-202-18 POWER SYSTEM DYNAMICS-II

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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: EEP5-203A-18 RESTRUCTURED POWER SYSTEMS

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	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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CO3: Define and describe the Technical and Non-technical issues	✓					✓	✓		Challenge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: Identify and give examples of existing electricity markets	✓	✓	✓						Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Classify different market mechanisms and summarize them	✓						✓	✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

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

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

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Formulation of electro-dynamic equations of all electric machines		✓	✓						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: EEP5-203D-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: Ability to model and design all types of rotation machines including special machines	✓	✓	✓	✓	✓	✓			Analyze	Yes	Experiments, Viva-Voce, End Semester Exams

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

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

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

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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 protocols	✓	✓	✓		✓				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3: Knowledge about single unified standard architecture IEC 61850					✓				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4: To learn about SCADA system components: remote terminal unit, master station	✓				✓				Utilization	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO5: Learn and understand about SCADA applications in transmission and distribution	✓				✓				Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-204C-18 POWER QUALITY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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 modeli	√	√	√	√						Designing	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:To introduce the student to active power factor correcti	√	√	√	√	√	√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO4:To introduce the student to series and shunt active power	√	√			√	√				Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: EEP5-204D-18 ARTIFICIAL INTELLIGENCE TECHNIQUES

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

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

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

Paper: EEP5-205B-18 POWER QUALITY LAB

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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: EEP5-206A-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: EEP5-205B-18 POWER 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
									Designing	Yes	Experiments, Viva-Voce, End Semester Exams
									Understand	Yes	Experiments, Viva-Voce, End Semester Exams

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

Paper: EEP5-206C-18 SMART GRIDS LAB

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

Paper: MTA-105-18 CONSTITUTION OF INDIA

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

Paper: MTA-106-18 PEDAGOGY STUDIES

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

Paper: MTA-107-18 STRESS MANAGEMENT BY YOGA

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

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

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

Paper: EEP5-301A-18 POWER SYSTEM TRANSIENTS

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

Paper: EEP5-301B-18 FACTS AND CUSTOM POWER DEVICES

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

Paper: EEP5-301C-18 INDUSTRIAL LOAD MODELING AND CONTROL

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

Paper: EEP5-301D-18 DYNAMICS OF LINEAR SYSTEMS

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

Paper: MTOE-301A-18 BUSINESS ANALYTICS

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

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

Paper: MTOE-301B-18 INDUSTRIAL SAFETY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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 maintenance	✓		✓		✓			✓	Identification	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:To get knowledge about all safety measures	✓				✓			✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301C-18 OPERATIONS RESEARCH

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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

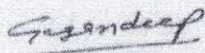
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus on	Assessment Tools to Measure Attainment of CO
CO1:Understand cost management process	✓				✓			✓	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:To execute project considering cost factor		✓	✓			✓		✓	Analyze	Yes	Mid-Term Tests, 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 reinforcement	✓								Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO2:Understand about strength and manufacturing of matrix	✓								Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams

Paper: MTOE-301F-18 WASTE TO ENERGY

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	Skill	Focus 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 energy	✓							✓	Understand	Yes	Mid-Term Tests, Tutorials, End Semester Exams
CO3:Know about biomass waste properties	✓							✓	Knowledge	Yes	Mid-Term Tests, Tutorials, End Semester Exams


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

- Draft -

MAPPING POS AND COS

Focus: refers to "Focus on employability/ entrepreneurship/ skill development"

PSRE-101/21






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

CO2: Understand the basic principles and application of comparators.	✓	✓												Learn	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand static version of different types of relays.	✓	✓												Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understand about numerical protection techniques.			✓											Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-103C/21 MATHEMATICAL METHODS FOR POWER ENGINEERING																
CO1: Knowledge about vector spaces, linear transformation, eigenvalues and eigenvectors of Linear operators	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8						Skill	Focus	Assessment tools to measure attainment of CO
CO2: Learn about linear programming problems and understanding the simplex method for solving linear programming problems in various fields of science and technology	✓													Knowledge	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	✓				✓									Understanding	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-103D/21 ANALYSIS OF POWER CONVERTER																
CO1: Develop a systematic approach AC-DC converters	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8						Skill	Focus	Assessment tools to measure attainment of CO
CO2: Develop 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																
CO1: Understand the concept of Solar Radiation Geometry.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8						Skill	Focus	Assessment tools to measure attainment of CO
CO2: 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			✓		✓									Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-104B/21 WASTE TO ENERGY CONVERSION TECHNOLOGIES																
CO1: Understand the basic principles and application of comparators.	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 related with waste and its impact on environment.																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of different type of disposal mechanism for handling different type of waste.																Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the analyse concept of recovery from industrial and agricultural waste																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of rural issues and the handling of biomass.																Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-104C/21																		
SMALL HYDRO AND NON-CONVENTIONAL TECHNOLOGIES																		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand the issues Small-hydro systems.																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Knowledge of different type of Energy from Oceans																Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Understand the analyse concept of Geothermal Energy																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Knowledge of Magneto Hydro Dynamic.																Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-104D/21																		
SOLAR ENERGY CONVERSION TECHNOLOGIES																		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO
CO1: Evaluate the solar thermal devices																Analysis	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: Optimize the solar thermal power generating system.																Apply	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: Knowledge of solar passive concepts and their application to buildings																Knowledge	Yes	Mid-semester tests, Assignments, End-semester examination
CO4: Understanding of government schemes & policies on solar energy.																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
MTRM-101/21																		
RESEARCH METHODOLOGY AND IPR																		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO
CO1: To understand research problem formulation and research ethics																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO2: To understand about control of information technology																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
CO3: To understand the need of IPR & its protection																Understand	Yes	Mid-semester tests, Assignments, End-semester examination
PSRE-105/21																		
COMPUTER AIDED POWER SYSTEM ANALYSIS LAB																		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO

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

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

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

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

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

Value of expenditure: 200000000

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

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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
MT0E-301B/21 INDUSTRIAL SAFETY COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: Understand about industrial safety and maintenance engineering	1	2	3	4	5	6	7	8							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
MT0E-301C/21 OPERATIONS RESEARCH COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: To learn the optimization techniques	1	2	3	4	5	6	7	8							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
MT0E-301D/21 COST MANAGEMENT OF ENGINEERING PROJECTS COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
CO1: To get knowledge about cost concept and cost management process	1	2	3	4	5	6	7	8							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				✓											Learning	Yes	Mid-semester tests, Assignments, End-semester examination
MT0E-301E/21 COMPOSITE MATERIALS COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	Skill	Focus	Assessment tools to measure attainment of CO
	1	2	3	4	5	6	7	8									

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
MITOE-301F/21 WASTE TO ENERGY COs																		
CO1: Understand classification of waste and about energy from waste	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8								Skill	Focus	Assessment tools to measure attainment of CO
	✓		✓													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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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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I.K. Gujral Punjab Technical University
Kaourthala-144006



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 interpret 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 interpret 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 interdisciplinary 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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(14/10/2021)
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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
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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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COs		POs
w.e.f. Batch 2021		
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2.	Power System Engineering CO1: to understand the applications of various compensation devices CO2: Apply the concept of FACTS controllers in advanced hybrid power research using modern engineering tools CO3: Study and analyze the stability under varying transient conditions	PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society. PO 4: Knowledge enhancement, positive impact toward the welfare and betterment of society and contribute to nation building.
3.	Power Electronics CO1: present the concepts of typical power electronic circuits: topologies and control. CO2: converter analysis, modeling, design and control of converters to different applications using modern engineering tools. CO3: design the controller for varied systems of engineering	PO 1: Perform an advanced research theory based, practiced and analyze the existing research of key thrust areas. PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.
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	CO2: Start the consultancy on energy management and engineering CO3: Analyze and interprets the various lighting systems and HVAC systems	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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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 CO3: To extend the development of prototypes of supervisory control schemes in research work	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.
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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	PO 2: Competent to undertake a novel work using modern engineering tools for creating a positive impact towards the welfare and betterment of society.
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13.	Renewable Energy Resources	

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

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