COURSE REGULATIONS, STRUCTURE AND DETAILED SYLLABI

FOR

M.TECH UNDER ACADEMIC REGULATIONS R25

FOR

M.Tech Regular (Full Time) Two Year Post Graduate Degree Programme

(For the Batches Admitted From 2025-2026)

POWER ELECTRONICS AND ELETRICAL DRIVES (PE&ED)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

Accredited by NBA, New Delhi & NAAC A+, Bangalore

Affiliated to JNTUA, Ananthapuramu,

Recognized by the UGC under Section 12 (B) and 12 (F) │ Approved by AICTE, New Delhi.

R.V.S. NAGAR, TIRUPATI ROAD, CHITTOOR – 517 127 (A.P) – INDIA

Website: www.svcetedu.org **E-mail:hodeee@svcetedu.org**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
R.V.S. NAGAR, CHITTOOR-517127. A.P
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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COURSE STRUCTURE & SYLLABI UNDER R25 REGULATIONS

I M. Tech, I Semester (PE & ED)

S.NO	Category	Course Code	Course Name	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
				L	T	P		CIE	SEE	TOTAL
1	PC	25BPE01	Switched Mode Power Converters	3	0	0	3	40	60	100
2	PC	25BPE02	Machine Modeling and Analysis	3	0	0	3	40	60	100
Program Elective - I										
3	PE-I	25BPE03	DC Drives	3	0	0	3	40	60	100
		25BPE04	Modern Control Theory							
		25BPE05	Energy Auditing and Management							
Program Elective -II										
4	PE-II	25BPE06	Solar Energy Conversion Systems	3	0	0	3	40	60	100
		25BPE07	Wind Energy Conversion Systems							
		25BPE08	Smart Grid Technologies							
5	PC	25BPE09	Power Electronics Lab	0	0	4	2	40	60	100
6	PC	25BPE10	Renewable Energy Sources Lab	0	0	4	2	40	60	100
7	MC	25BMB01	Research Methodology and IPR	2	0	0	2	40	60	100
8	SE	25BPE11	AI Techniques in Electrical Engineering	2	0	0	2	40	60	100
AUDIT COURSE -I										
9	AC	25BHS04	English for Research Paper Writing	2	0	0	0	0	0	0
		25BST11	Disaster Management							
		25BHS05	Essence of Indian Traditional Knowledge							
TOTAL				**18**	**0**	**8**	**20**	**320**	**480**	**800**

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I M. Tech, II Semester (PE & ED)

S.NO	Category	Course Code	Course Name	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
				L	T	P		CIE	SEE	TOTAL
1	PC	25BPE12	Advanced Power Electronics	3	0	0	3	40	60	100
2	PC	25BPE13	FACTS Controllers	3	0	0	3	40	60	100
Program Elective - III										
3	PE-III	25BPE14	AC Drives	3	0	0	3	40	60	100
		25BPE15	Advanced Power Semiconductor Devices & Protection							
		25BPE16	Applications of Power Converters							
Program Elective -IV										
4	PE-IV	25BPE17	Power Quality	3	0	0	3	40	60	100
		25BPE18	EV Charging Infrastructure & Technology							
		25BVL31	Digital Signal Processors and applications							
5	PC	25BPE19	Electric Drives Lab	0	0	4	2	40	60	100
6	PC	25BPE20	FACTS Devices & Simulation Lab	0	0	4	2	40	60	100
7	MC	25BCS22	Quantum Technologies and Applications	2	0	0	2	40	60	100
8	PC	25BPE21	Comprehensive Viva Voce	0	0	0	2	00	100	100
AUDIT COURSE -II										
9	AC	25BMB02	Pedagogy Studies	2	0	0	0	0	0	0
		25BHS06	Yoga for Stress Management							
		25BHS07	Personality Development through Life Enlightenment Skills							
TOTAL				**16**	**0**	**8**	**20**	**280**	**520**	**800**

****Students have to undergo an Industry Internship after I Year II Semester for a duration of 6 to 8 weeks**

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II M. Tech, III Semester (PE & ED)

S.NO	Category	Course Code	Course Name	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
				L	T	P		CIE	SEE	TOTAL
Program Elective - V										
3	PE-V	25BPE22	Control & Integration of Renewable Energy Sources	3	0	0	3	40	60	100
		25BPE23	Energy Storage Technologies							
		25BPE24	Hybrid Electric Vehicle Engineering							
Open Elective-I										
4	OE-I	25BPE25	Photovoltaic Systems	3	0	0	3	40	60	100
		25BCS01	Advanced data structures & Algorithms							
		25BCS04	Cloud Computing							
5	PR	25BPE26	Dissertation Phase – I	0	0	20	10	40	60	100
6	IN	25BPE27	Industry Internship	0	0	0	2	--	100	100
7	CC	25BPE28	Co- Curricular Activities	0	0	0	1	-	-	-
TOTAL				**06**	**0**	**20**	**19**	**120**	**280**	**400**

II M. Tech, IV Semester (PE & ED)

S.NO	Category	Course Code	Course Name	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
				L	T	P		CIE	SEE	TOTAL
1	PR	25BPE29	Dissertation Phase – II	0	0	32	16	120	180	300
TOTAL				0	0	32	16	120	180	300

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	SWITCHED MODE POWER CONVERTERS	L	T	P	C
25BPE01		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Remember and understand the concept of Buck and Boost switching regulator topologies push- pull &forward converter, voltage & current fed topologies.

CO2. Apply the concept of topologies for various switching regulators.

CO3. Analyze the concepts of half & full bridge converter topologies

CO4. Evaluate the operation of continuous and dis-continuous Flyback converter topologies

UNIT – I Fundamental Switching Regulators-Buck and Boost Topologies

Buck Switching Regulator Topology: Basic Operation - Significant Current waveforms -Buck regulator efficiency-Design relations of output filter inductor and capacitor. Boost Switching Regulator Topology: Basic Operation – Quantitative relations –Discontinuous and Continuous modes -Design relations.

UNIT II Push-Pull and Forward Converter Topologies:

Push-Pull Topology: Basic Operation – Master/slave outputs - Flux imbalance -Power transformer design relations - Primary, secondary peak and RMS currents - output power and input voltage limitations - output filter design relations. Forward Converter Topology: Basic operation -Design relations - Slave output voltages -secondary load –freewheeling diode and inductor currents. Forward converter with unequal power and reset winding turns - power transformer design and output filter design.

UNIT III Half and Full bridge Converter Topologies:

Half Bridge Converter Topology: Basic operation-Half bridge magnetic-output filter calculations, blocking capacitor to avoid flux imbalance- Half bridge leakage inductance problems. Full Bridge Converter Topology: Basic operation-Full Bridge magnetic –out put filter calculations – transformer primary blocking capacitor

UNIT IV Fly back Converter Topologies:

Discontinuous-Mode Fly backs: Basic operation - relation between output voltage versus input voltage- on time output load - design relations and sequential decision requirements –fly back

converter, disadvantages. Continuous Mode Fly backs: Basic operation - Discontinuous mode to continuous mode transition - design relations– continuous mode fly backs.

UNIT V Voltage-Fed and Current-Fed Topologies:

Definitions-deficiencies of voltage fed pulse width modulated full wave bridge-buck voltage fed full wave bridge topology – basic operation buck voltage fed full wave bridge– advantages-drawbacks in buck voltage fed full wave bridge - buck current fed full wave bridge topology – basic operation – fly back current fed push pull topology.

TEXTBOOKS:

1. Pressman A. I, Switching Power Supply Design, McGraw Hill, 3rd edition, 2009..
2. Mitchell. M, DC-DC Switching Regulator Analysis, Mc Graw Hill, 1st edition, 1988.

REFERENCE BOOKS:

1. Ned Mohan, Power Electronics, John Wiley, 3rd edition, 2011.
2. Otmar Kingenstein, Switched Mode Power Supplies in Practice, John Wiley, 1st edition, 1991.
3. Billings K.H.,Handbook of Switched Mode Power Supplies, McGrawHill,3rd edition, 2010
4. Nave M.J, Power Line Filter Design for Switched-Mode Power Supplies, Mark Nave Consultants, 2nd edition, 2010.

Online Learning Resources:

1 https://ee.iisc.ac.in/wp-content/uploads/2023/01/SMPC_VRamnarayanan.pdf
2 http://acl.digimat.in/nptel/courses/video/108108036/lec1.pdf

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CHITTOOR – 517 127 (A.P)

M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	MACHINE MODELLING & ANALYSIS	L	T	P	C
25BPE02		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the Concept Magnetically Coupled Circuits, Types of DC machines, commonly used Reference Frames, machines variables, Time domain and state equations, Permanent Magnet Brushless DC Motor Operating principle.

CO2. Apply the concept of Change of Variables and Transformation to an Arbitrary Reference Frame, Equal Area Criteria.

CO3. Analyze the Free Acceleration Characteristics viewed from Various Reference Frames, Steady-State Analysis and its Operation ,dynamic analysis of machines, Mathematical modeling of PM Brushless DC motor.

CO4. Design the modeling of DC machines, Three phase Induction machines, Synchronous machine.

UNIT – I Basic Principles and Analysis of DC Machines

Basic Principles for Machine Analysis: Magnetically coupled circuits - Machine windings - Air-Gap MMF-Winding inductances - Voltage equations. Modeling and Analysis of DC Machines: Elementary theory of DC Machine - Voltage and Torque Equations- Types of DC Machines - Permanent and Shunt DC Motors - Time-Domain and State-Equations.

UNIT - II Reference Frame Theory

Fundamentals of Transformations - Equations of Transformations - Change of Variables and Transformation to an Arbitrary Reference Frame - Commonly used Reference Frames - Transformation between Reference Frames - Steady-State Phasor Relationships and Voltage Equations

UNIT - III Modelling & Dynamic Analysis of Three Phase Induction Machines

Voltage and Torque Equations in Machine Variables - Voltage and Torque Equations in Arbitrary Reference Frame - Steady-State Analysis and its Operation. Free Acceleration Characteristics viewed from Various Reference Frames - Dynamic Performance during Sudden Changes in Load Torque - Dynamic Performance during A Three-Phase Fault at the Machine Terminals.

UNIT - IV Modelling & Dynamic Analysis of Synchronous Machines

Voltage in Machine Variables - Torque equation in Machine Variables - Voltage Equations in Arbitrary and Rotor Reference Frame - Torque Equations in Substitute Variable- Steady-State Analysis and its Operation. Dynamic Performance of Synchronous Machine - Three-Phase Fault, Comparison of Actual and Approximate Transient Torque Characteristics, - Equal Area Criteria.

UNIT - V Modeling of Special Machines

Modeling of Permanent Magnet Brushless DC Motor - Operating principle – Mathematical modeling of PM Brushless DC motor - PMDC Motor Drive Scheme.

TEXTBOOKS:

1. PaulC. Krause, Oleg Wasyzczuk, ScottS, Sudhoff, "Analysis of Electric Machinery and Drive Systems", IEEE Press, 3rd Edition, 2013.
2. R. Krishnan, "Electric Motor Drives, Modeling, Analysis and Control" , Pearson Education India, 4th edition, 2015.

REFERENCE BOOKS:

1. P. C. Krause, "Analysis of Electric Machinery", McGraw Hill, 3rd edition, 2013.
2. Samuel Seely, "Electro mechanical Energy Conversion", Tata Mc Graw Hill Publishing Company, 1st edition, 1962
3. A.E, Fitzgerald, Charles Kingsley, Jr, and Stephan D ,Umanx, "ElectricMachinery" ,Tata Mc Graw Hill, 7thEdition, 2020.
4. P. Kundur, "Power System Stability and Control", MC Graw Hill Education, 1st edition, 2006..

Online Learning Resources:

1. https://nptel.ac.in/courses/108106023
2. https://www.youtube.com/watch?v=2R4qaiRXvmM

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVE

Course Code	DC DRIVES		T	P	C
25BPE03	(PE-I)	3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Remember and understand the concept Separately excited single phase and three phase rectifier with DC Motor load drives.

CO2. Apply the concept of phase controlled technique for DC motor Drives.

CO3. Analyze the current and speed controlled Drives.

CO4. Design of chopper controlled DC motor Drives in various quadrants.

UNIT – I Controlled Bridge Rectifier (1-Φ& 3-Φ) With Dc Motor Load

Separately excited DC motors with rectified single phase supply- single phase semi converter and single phase full converter for continuous and discontinuous modes of operation–power and power factor. Three phase semi converter and three phase full converter for continuous and discontinuous modes of operation–power and power factor– Addition of Freewheeling diode.

UNIT – II Three phase naturally commutated bridge circuit as a Rectifier or as an Inverter

Three phase controlled bridge rectifier with passive load impedance - resistive load and ideal supply – Highly inductive load and ideal supply for load side and supply side quantities - shunt capacitor compensation – three phase controlled bridge rectifier inverter.

UNIT – III Phase Controlled DC Motor drives

Three phase controlled converter - control circuit - control modeling of three phase converter – Steady state analysis of three phase converter control DC motor drive – Two quadrant, Three phase converter controlled DC motor drive – DC motor and load, converter.

UNIT - IV Current and Speed controlled DC Motor drives

Current and Speed controllers -current and speed feedback — Design of controllers - Current and Speed controllers – Motor equations– Filter in the speed feedback loop speed controller–current reference generator – current controller and flow chart for simulation – Harmonics and associated problems– sixth harmonics torque.

UNIT - V Chopper controlled DC Motor drives

Principle of operation of the chopper– Four quadrant chopper circuit–Chopper for inversion – Chopper with other power devices – model of the chopper –input to the chopper – Steady state

analysis of chopper controlled DC motor drives –rating of the devices– Pulsating torque – Closed loop operation of DC motor Drives Speed controlled drive system – current control loop – pulse width modulated current controller – hysteresis current controller– modelling of current controller– design of current.

TEXTBOOKS:

1. Fundamentals of Electric Drives –G.K.Dubey– Narosa Publications -2nd edition, 2020.
2. Power Semiconductor drives–S.B.Dewanand A.Straughen –Wiley India edition-1st edition, 2009.

REFERENCE BOOKS:

1. Power Electronics and motor control–Shepherd, Hulley, Liang, CUPress, 2nd edition 1995
2. Electric motor drives modeling, Analysis and control –R.Krishnan, PHI, 5th edition, 2015
3. Power Electronic Circuits, Devices and Applications-M. H. Rashid, PHI, 4thedition, 2017

Online Learning Resources:

1. *https://sravivarman.com/course/power-electronic-control-of-dc-drives/*
2. https://nptel.ac.in/courses/108108077

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	MODERN CONTROL THEORY (PE-I)	L	T	P	C
25BPE04		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the state space representation, controllability and observability concepts, principles of duality, concepts of optimal and Lyapunov stability.

CO2. Apply the state equations, pole placement by state feedback.

CO3. Analyze controllability & observability of state models.

CO4. Design full order observer and reduced order observer.

UNIT – I State Variable Description

Introductory matrix algebra and linear Vector Space, State space representation of systems- Linearization of a non-linear System- Solution of state equations- Evaluation of State Transition Matrix (STM).

UNIT II Transformation, Pole placement and Controllability :

Similarity transformation and invariance of system properties due to similarity transformations. Minimal realization of SISO, SIMO and MISO transfer functions. Discretization of a continuous time state space model- Conversion of state space model to transfer function model using Fadeeva algorithm- Fundamental theorem of feedback control - Controllability and Controllable canonical form - Pole assignment by state feedback using Ackermann‘s formula– Eigen structure assignment problem.

UNIT III Optimal Control:

Linear Quadratic Regulator (LQR) problem and solution of algebraic Riccati equation using Eigen value and Eigen vector methods- iterative method- Controller design using output feedback.

UNIT IV Observers:

Observability and observable canonical form-Design of full order observer using Ackermann‘s formula -Bass Gura algorithm- Duality between controllability and observability- Full order Observer based controller design- Reduced order observer design.

UNIT V Stability Analysis and Sensitivity:

Internal stability of a system- Stability in the sense of Lyapunov- Asymptotic stability of linear time invariant continuous and discrete time systems- Solution of Lyapunov type equation- Model

decomposition and decoupling by state feedback- Disturbance rejection- sensitivity and complementary sensitivity functions.

TEXTBOOKS:

1. K. Ogata, "Modern Control Engineering", Prentice Hall, India, 5th edition, 2010.
2. T. Kailath, "Linear Systems", Prentice Hall, 2016.
3. N.K. Sinha, "Control Systems", New Age International, 4th edition, 2013.

REFERENCE BOOKS:

1. Panos J Antsaklis, and Anthony N.Michel,"Linear Systems", New-age international (P) LTD.Publishers, 2009.
2. John JD Azzoand C. H. Houpis, "Linear Control System Analysis and Design conventional and Modern", Mc Graw- Hill Book Company, 3rd edition, 1988
3. C.T. Chen " Linear System Theory and Design"-PHI, India,1984.
4. Nave M.J, Power Line Filter Design for Switched-Mode Power Supplies, Mark Nave Consultants, 2nd edition, 2010.
5. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", 11th Edition, Pearson Edu., India, 2009.

Online Learning Resources:

1. http://www.digimat.in/nptel/courses/video/108103007/L01.html

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ENERGY AUDITING AND MANAGEMENT (PE-I)	L	T	P	C
25BPE05		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the current energy scenario and importance of energy conservation.

CO2. Acquire the knowledge about different energy efficient devices.

CO3. Measure efficiency in renewable energy resources.

CO4. Identify the equipment and areas of a system where energy conservation and Audit is necessary.

UNIT – I Energy audit and demand side management (DSM) in power utilities

Energy Scenario & Conservation -Demand Forecasting Techniques- Integrated Optimal Strategy for Reduction of T&D Losses - DSM Techniques and Methodologies- Loss Reduction in Primary and Secondary Distribution system and capacitors - Energy Management – Role of Energy Managers – Energy Audit-Metering

UNIT II Energy audit :

Energy audit concepts - Basic elements and measurements - Mass and energy balances - Scope of energy auditing in industries - Evaluation of energy conserving opportunities and environmental management - Preparation and presentation of energy audit reports - case studies and potential energy savings.

UNIT III Instrumentation:

General Audit Instrumentation –Measuring building losses – Applications of IR thermo graphy – Measurement of electrical system performance – Measurement of heating, ventilation, air conditioning system performance – Measurement of combustion systems.

UNIT IV Energy conservation:

Energy conservation in HVAC systems and thermal power plants, Solar systems, Fan and Lighting Systems - Different light sources and luminous efficiency.

UNIT V Economic evaluation of energy conservation:

Energy conservation in electrical devices and systems - Economic evaluation of energy conservation Measures - Electric motors and transformers - Inverters and UPS - Voltage stabilizers.

TEXTBOOKS:

1. Frank kreith and D. Yogi goswamy/ Editors, “Energy Management and conservation handbook”. NewYork,2008.
2. WC Turner: Energy Management Handbook, Seventh Edition, (Fairmont Press Inc., 2007).
3. YP Abbi and Shashank Jain: Handbook on Energy Audit and Environment Management, (TERIPress, 2006)

REFERENCE BOOKS:

1. Albert Thumann, and William J. Younger, “Handbook of Energy Audits”, Marcel Dekker, Inc., Newyork, 6th edition, 2003.
2. D.A.Reay, Industrial Energy Conservation-Pergamon Press, 1980.
3. T.L.Boten, LiptakB.G.,(Ed) Instrument Engineers Handbook, Chinton Book Company, 2004.
4. Hodge B.K, Analysis and Design of Energy Systems, Prentice Hall, 2002.
5. Larry C.Witte, Schmidt & Brown, Industrial energy management and utilization. Hemisphere publishing, Co. NewYork, 1988.

Online Learning Resources:

1. **https://onlinecourses.swayam2.ac.in/nou23_es05/preview**
2. **https://onlinecourses.nptel.ac.in/noc25_ar10/preview**

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	SOLAR ENERGY CONVERSION SYSTEMS (PE–II)	L	T	P	C
25BPE06		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the fundamentals of solar cell, Solar PV Modules from solar cells, system types, Standalone PV system configuration, Maximum Power Point tracking (MPPT).

CO2. Apply the concept of various technologies of solar PV cells, manufacture, sizing and operating techniques.

CO3. Analyze the concept of Effect of series and shunt resistance on efficiency, Effect of solar radiation on efficiency, Analytical techniques, Hot spots in the module, Algorithms for MPPT.

CO4. Design of PV powered DC fan without battery, Standalone system with DC load using MPPT, PV powered DC pump, standalone system with battery and AC/DC load.

UNIT – I Solar Cell Fundamentals

Introduction to solar PV system, history of photovoltaic's, photovoltaic effect, photovoltaic cell, PV Cell Material, equivalent circuit, electrical characteristics, PV terminology, maximum power point tracking.

UNIT II Partial Shading:

Partial shading of PV arrays, causes, effect of partial shading on PV power, hot spots, bypass diode, PV characteristics, interconnection schemes, series and parallel connection, total cross tied (TCT), honey comb (HC), bridge linked (BL), reconfiguration techniques, electrical array reconfiguration techniques, Su Do Ku based reconfiguration technique.

UNIT III MPPT:

Maximum power point tracking algorithm, direct methods, differentiation method, feedback voltage or current method, perturb and observe method, incremental conductance method, parasitic capacitance method, indirect methods, curve fitting method, look up table method, open circuit voltage sensing method, short circuit current sensing method, artificial intelligence techniques, artificial neural network, fuzzy logic, genetic algorithm, algorithm for non-uniform insulation conditions, Fibonacci search method, short current pulse method, two stage method.

UNIT IV Converter and Inverter Operations:

Buck converter, boost converter, buck boost converter, CUK converter, SEPIC converter, charge controller, shunt controller, series controller, inverters, inverter operation, power quality standards, grid interconnection techniques.

UNIT V PV System Design and Applications:

Design of PV powered DC fan without battery- Standalone system with DC load using MPPT- Design of PV powered DC pump- Design of standalone system with battery and AC/DC load – Wire sizing in PV system – Precise sizing of PV systems – Hybrid PV systems –Grid connected PV systems, Rooftop Systems..

TEXTBOOKS:

1. Chetan singhsolanki "Solar Photovoltaic Fundamentals: Technologies and Applications", PHI publications, 3rd edition, 2015.
2. Van Overstraeton and Metens R.P,. 'Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol, 1996.

REFERENCE BOOKS:

1. HKonrad Mertens, 'Photovoltaics Fundamentals technology and Practice', Wiley publications 2014.
2. Chetan Singh Solangi, 'Solar Photovoltaics Technology and Systems', 2013.

Online Learning Resources:

1. **https://onlinecourses.nptel.ac.in/noc20_ph14/preview**
2. **https://nptel.ac.in/courses/117108141**
3. **https://nptel.ac.in/courses/108105066**
4. **https://nptel.ac.in/courses/115103123**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	WIND ENERGY CONVERSION SYSTEMS (PE-II)	L	T	P	C
25BPE07		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the concepts of fixed speed and variable speed wind energy conversion systems.

CO2. Analyze the grid integration issues.

CO3. Apply variable speed turbines for wind generation.

CO4. Design and control principles of wind turbine

UNIT – I Fundamentals of Wind Turbines

Historical background - Basics of mechanical to electrical energy conversion in wind energy -Types of wind energy conversion devices – Definition - Solidity, tip speed ratio, power coefficient, wind turbine ratings and specifications- Aerodynamics of wind rotors - Design of the wind turbine rotor.

UNIT II Wind Turbine Control Systems & Site Analysis:

Wind Turbine-Torque speed characteristics-Pitch angle control –Stall control –Power electronic control – Yaw control – Control strategy – Wind speed measurements – Wind speed statistics –Site and turbine selection.

UNIT III Basics of Induction and Synchronous Machines:

The Induction Machine – Constructional features-Equivalent circuit model- Performance characteristics - Saturation characteristics – Dynamic d-q model – The wound field synchronous machine – The permanent magnet synchronous machine – Power flow between two synchronous sources – Induction generator versus synchronous generator.

UNIT IV Grid Connected and Self-Excited Induction Generator Operation:

Constant voltage, constant frequency- Single output system –Double output system with current converter & voltage source inverter–Equivalent circuits–Reactive power and harmonics- Reactive power compensation–variable voltage, variable frequency–The self-excitation process–Circuit model for the self- excited induction generator–Analysis of steady state operation–The excitation requirement–Effect of a wind generator on the network..

UNIT V Wind Generation with Variable- Speed Turbines and Application:

Classification of schemes–Operating area–Induction generators–Doubly fed induction generator – Wound field synchronous generator – The permanent magnet generator – Merits and limitations of

wind energy conversion systems – Application in hybrid energy systems – Diesel generator and photo voltaic systems – Wind photovoltaic systems.

TEXTBOOKS:

1. S.N. Bhadra, D. Kastha, S. Banerjee, "wind electrical systems", Oxford University Press, 1st edition, 2005.
2. Banshi D. Shukla, "Engineering of Wind Energy", Jain Brothers, 1st edition, 2018

REFERENCE BOOKS:

1. S.Rao & B.B. Parulekar, "Energy Technology", Khanna publishers, 4th edition, 2005.
2. N.K.Bansal,.Kleemann,MichaelMeliss,RenewableEnergysources&ConversionTechnology,TataMcgraw HillPublishers & Co., 1st edition, 1990.

Online Learning Resources:

1. *https://onlinecourses.nptel.ac.in/noc25_ae12/preview*
2. https://onlinecourses.nptel.ac.in/noc21_ee24/preview

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	SMART GRID TECHNOLOGIES (PE-II)	L	T	P	C
25BPE08		3	0	0	3
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the importance of smart grid technology functions over the present grid.

CO2. Apply the knowledge about the measurement system and communication technology of Smart grid.

CO3. Determine the quality, efficiency and security of power supply.

CO4. Impart an understanding of economics, policies and technical regulations for DG integration.

UNIT – I Smart Grids:

Smart grid overview- ageing assets and lack of circuit capacity- thermal constraints, operational constraints, security of supply- national initiatives- early smart grid initiatives- active distribution networks- virtual power plant- other initiatives and demonstrations- overview of the technologies required for the smart grid..

UNIT II Transmission and Distribution Management:

Data Sources- Energy Management System-Wide Area Applications, Visualization Techniques-Data Sources and Associated External Systems- SCADA- Customer Information System- Modeling and Analysis Tools, Distribution System Modeling- Topology Analysis- Load Forecasting- Power Flow Analysis- Fault Calculations- State Estimation- Applications-System Monitoring- Operation-Management- Outage Management System- Overview of energy storage technologies..

UNIT III Smart Metering and Demand Side Integration:

Overview- Smart metering – Evolution of electricity metering- key components of smart metering-smart meters: an overview of the hardware used – signal acquisition- signal conditioning-analogue to digital conversion- computation-input/output and communication. Communication infrastructure and protocols for smart metering - Home area network, Neighborhood Area Network- Data Concentrator- meter data management system- Protocols for communication. Demand Side Integration- Services Provided by DSI-Implementation of DSI- Hardware Support- Flexibility Delivered by consumers from the Demand Side- System Support from DSI.

UNIT IV Communication Technologies for the Smart Grid:

Data Communications: Dedicated and Shared Communication Channels, Switching Techniques, Circuit Switching, Message Switching, Packet Switching- Communication Channels, Introduction to TCP/IP. Communication Technologies: IEEE 802 Series- Mobile Communications- Multi-Protocol Label Switching- Power line Communication.

UNIT V Information Security for the Smart Grid:

Overview- Encryption and Decryption, Symmetric Key Encryption- Public Key Encryption- Authentication- Authentication Based on Shared Secret Key- Authentication Based on Key Distribution Center- Digital Signatures- Secret Key Signature-Public Key Signature- Message Digest..

TEXTBOOKS:

1. Janaka Ekanayake, Kithsiri Liyanage, et.al., Smart Grid Technology and Applications, Wiley Publications, 1st edition, 2012.
2. James Momoh, Smart Grid: Fundamentals of Design and Analysis, Wiley, IEEE Press, 1st edition, 2012.
3. Bharat Modi, Anuprakash, Yogesh Kumar, Fundamentals of Smart Grid Technology, S.K Kataria & Sons, 1st edition, 2019.

REFERENCE BOOKS:

1. Eric D. Knapp, Raj Samani, Applied Cyber Security and the Smart Grid-Implementing Security Controls into the Modern Power Infrastructure, Syngress Publishers, 1st edition, 2013.
2. Nouredine Hadjsaid, Jean Claude Sabonnadiere, Smart Grids, Wiley Blackwell Publications, 1st edition, 2012.
3. Peter-Fox Penner, Smart Power: Climate Changes, the Smart Grid and the future of electric utilities, Island Press, 1st edition, 2010.

Online Learning Resources:

www.indiasmartgrid.org

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	POWER ELECTRONICS LAB	L	T	P	C
25BPE09		0	0	4	2
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the basic concept and its operation of Power Electronic converters.

CO2. Analyze the output waveforms of the various converters designed.

CO3. Apply mathematical relations to find THD and verify it practically.

CO4. Design different controllers using Simulink.

LIST OF EXPERIMENTS:

1. Single Phase Fully Controlled Converter with R and R-L loads using MATLAB
2. Three Phase Fully Controlled Converter with R and R-L loads using MATLAB
3. Single Phase AC Voltage Controller with R and R-L loads using MATLAB.
4. Three Phase AC Voltage Controller with R and R-L loads using MATLAB.
5. Three Phase Inverter in 180° & 120° Conduction Mode with Star & Delta Connected loads using MATLAB.
6. Buck, Boost and Buck- Boost converter using MATLAB.
7. Closed loop control of Buck and Boost converter
8. Single Phase cycloconverter using MATLAB
9. Three Phase cycloconverter using MATLAB.
10. Single Phase Full Controlled Converter with R and R-L loads.
11. Designing of induction motor using Simulink.
12. Performance measurement and analysis of 1-phase IGBT inverter with sinusoidal PWM control.
13. Performance measurement and analysis of isolated DC-DC push-pull regulator.
14. Hysteresis current control of a single-phase inverter.

REFERENCES:

1. PowerElectronicCircuits,DevicesandApplications-M.H.Rashid–PHI,2017.
2. Ned Mohan, Power Electronics, JohnWiley,3rdedition,2011.

Online Learning Resources:

1. **https://pe-iitr.vlabs.ac.in/Introduction.html**
2. **https://pe1-iitd.vlabs.ac.in/Introduction.html**
3. **https://pe2-iitd.vlabs.ac.in/**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	RENEWABLE ENERGY SOURCES LAB	L	T	P	C
25BPE10		0	0	4	2
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. To observe the I-V and P-V curves and Series and Parallel connection of Solar systems.

CO2. To study the sun tracking and MPPT Charge Controllers of Solar systems.

CO3. To analyze Power, Voltage & Frequency Measurement of Wind Generator.

CO4. To Understand the Effect of temperature variation and Irradiation on Photovoltaic Array.

LIST OF EXPERIMENTS:

1. Draw the I-V and P-V curves of Solar Panel using PV Panel
2. Study of Series and Parallel connection of Solar Panels
3. Study of Sun tracking system
4. Maximum Power Point Tracking Charge Controllers
5. Inverter control for Solar PV based systems
6. Power, Voltage & Frequency Measurement of output of Wind Generator
7. Impact of load and wind speed on power output and its quality
8. Performance of frequency drop characteristics of induction generator at different loading condition
9. Charging and discharging characteristics of Battery

Simulation Experiments

1. Modeling of PV Cell
2. Effect of temperature variation on Photovoltaic Array
3. Effect of Irradiation on a Photovoltaic Array
4. Design of solar PV boost converter using P&O MPPT technique

REFERENCES:

1. PowerElectronicCircuits,DevicesandApplications-M.H.Rashid–PHI,2017
2. Ned Mohan, Power Electronics, JohnWiley,3rdedition,2011

WEB SOURCES: https://www.vlab.co.in

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	RESEARCH METHODOLOGY AND IPR	L	T	P	C
25BMB01		2	0	0	2
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Recall key concepts and terminology related to research design, data collection, and intellectual property rights.

CO2. Explain the importance of research design and data analysis in research studies, and describe the concept of intellectual property rights.

CO3. Design a research study, including data collection and analysis methods, and apply intellectual property rights principles to protect research findings.

CO4. Analyze research studies to identify strengths and limitations, and evaluate the effectiveness of data collection and analysis methods

CO5. Assess the impact of intellectual property rights on research and innovation, and evaluate the effectiveness of research designs and methods.

CO6. Develop a comprehensive research plan, including a detailed research design, data collection and analysis methods, and a plan for protecting intellectual property.

UNIT – I : FUNDAMENTALS OF RESEARCH METHODOLOGY

Overview of research process and design - Types of Research - Approaches to Research (Qualitative vs Quantitative) - Observation studies, Experiments and Surveys - Use of Secondary and exploratory data to answer the research question - Importance of Reasoning in Research and Research ethics - Documentation Styles (APA/IEEE etc.) - Plagiarism and its consequences.

Learning Outcomes

- Recall key concepts of the research process, including different types and approaches to research, and the importance of ethics.
- Differentiate between qualitative and quantitative research approaches and the various uses of secondary data.
- Identify the core principles of research design and ethics, including plagiarism and documentation styles.
- Explain the significance of reasoning and ethical conduct in all stages of the research process.

- Apply knowledge of different documentation styles, such as APA and IEEE, to properly cite sources and avoid plagiarism

UNIT II: DATA COLLECTION AND SOURCES

Importance of Data Collection - Types of Data - Data Collection Methods - Data Sources - primary, secondary and Big Data sources - Data Quality & Ethics - Tools and Technology for Data Collection.

Learning Outcomes

- Identify different types of data and the various methods for collecting both primary and secondary data.
- Explain the importance of data quality and ethical considerations in data collection.
- Differentiate between primary, secondary, and Big Data sources.
- Describe the various tools and technologies used for effective data collection.
- Analyze the ethical implications of data collection and ensure data quality in a research study.

UNIT III: DATA ANALYSIS AND REPORTING

Overview of Multivariate analysis - Experimental research, cause-effect relationship, and development of hypotheses- Measurement systems analysis, error propagation, and validity of experiments - Guidelines for writing abstracts, introductions, methodologies, results, and discussions - Writing Research Papers & proposals

Learning Outcomes

- Apply knowledge of multivariate analysis and experimental research to develop hypotheses and analyze data.
- Explain the process of measurement systems analysis and error propagation in experimental design.
- Formulate clear and concise abstracts, introductions, and methodologies for research papers.
- Write effective results and discussion sections based on data analysis.
- Develop comprehensive research papers and proposals based on proper data analysis and reporting guidelines.

UNIT IV: UNDERSTANDING INTELLECTUAL PROPERTY RIGHTS

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

Learning Outcomes

- Recall the fundamental concepts of Intellectual Property (IP) and its evolution.
- Describe the roles of organizations like **WIPO** and **WTO** in the establishment of IPR.
- Differentiate between various types of IPR, including trade secrets and trademarks.

- Explain the common rules and features of IPR agreements and the role of UNESCO.
- Analyze the relationship between IPR and biodiversity, and its broader impact.

UNIT V: PATENTS

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification - Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licenses, Licensing of related patents, patent agents, Registration of patent agents

Learning Outcomes

- Explain the objectives, benefits, and key features of a patent, including the concept of an inventive step.
- Differentiate between the various types of patent applications and the e-filing process.
- Describe the process of patent examination, grant, and revocation.
- Identify the roles of patent agents and the process for their registration.
- Analyze the concepts of equitable assignments, licenses, and licensing of related patents.

TEXTBOOKS:

1. Stuart Melville and Wayne Goddard, Research Methodology: An introduction for Science & Engineering students, Juta and Company Ltd, 2004
2. Catherine J. Holland, Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets, Entrepreneur Press, 2007.

REFERENCE BOOKS:

1. Cooper Donald R, Schindler Pamela S and Sharma JK, “Business Research Methods”, Tata McGraw Hill Education 11e (2012).
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners. . David Hunt, Long Nguyen, Matthew Rodgers, “Patent searching: tools & techniques”, Wiley, 2007.
3. Deborah E. Bouchoux , Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, 6th Edition, Cengage 2024.
4. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, The Craft of Research, 5th Edition, University of Chicago Press, 2024.
5. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, “Professional Programme Intellectual Property Rights, Law and practice”, September 2013.
6. Peter Elbow, Writing With Power, Oxford University Press, 1998.

Online Resources (Free & Authentic)

1. Coursera / edX – Research Methodology and Data Analysis courses
2. Springer Link & Science Direct – Latest journals on research design and statistics
3. Google Scholar – Free access to research papers.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	SKILL ENHANCEMENT COURSE AI TECHNIQUES IN ELECTRICAL ENGINEERING	L	T	P	C
25BPE11		2	0	0	2
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand feed forward neural networks, feedback neural networks and learning techniques.

CO2. Apply selected basic AI techniques; judge applicability of more advanced techniques.

CO3. Analyze &Develop fuzzy logic control for applications in electrical engineering.

CO4. Develop genetic algorithm for applications in electrical engineering

UNIT – I Artificial Neural Networks :

Introduction-Models of Neural Network - Architectures – Knowledge representation – Artificial Intelligence and Neural networks – Learning process – Error correction learning – Hebbian learning – Competitive learning – Boltzmann learning – Supervised learning –Unsupervised learning – Reinforcement learning –learning tasks.

UNIT II ANN Paradigms:

Multi – layer perceptron using Back propagation Algorithm-Self – organizing Map –Radial Basis Function Network–Functional link, network– Hopfield Network.

UNIT III Fuzzy logic:

Introduction – Fuzzy versus crisp – Fuzzy sets - Membership function – Basic Fuzzy set operations – Properties of Fuzzy sets – Fuzzy Cartesian Product – Operations on Fuzzy relations – Fuzzy logic – Fuzzy Quantifiers-Fuzzy Inference- Fuzzy Rule based system– Defuzzification methods..

UNIT IV Genetic Algorithms:

Introduction-Encoding– Fitness Function-Reproduction operators–Genetic Modeling –Genetic operators- Crossover- Single–site crossover –Two-point cross over–Multi point cross over-Uniform cross over–Matrix cross over-Cross over Rate-Inversion & Deletion–Mutation operator–Mutation–Mutation Rate-Bit-wise operators-Generational cycle- convergence of Genetic Algorithm.

.**UNIT V Applications of AI Techniques:**

Load forecasting – Load flow studies – Economic load dispatch –Load frequency control – Single area system and two area system – Small Signal Stability (Dynamic stability) Reactive power control – speed control of DC and AC Motors.

TEXTBOOKS:

1. S.Rajasekaran and G.A.V.Pai,"NeuralNetworks,FuzzyLogic&GeneticAlgorithms" PHI,New Delhi, 2nd edition,2017..
2. Sudarshan K. Valluru and T. Nageswara Rao, "introduction to Neural Networks, Fuzzy Logic & Genetic Algorithms", Jaico Publishing House, 1st edition, 2010..

REFERENCE BOOKS:

1. P.D.Wasserman,VanNostrandReinhold," NeuralComputingTheory&Practice",NewYork,1st . Eddition ,1989.
2. BartKosko,"NeuralNetwork&FuzzySystem",PrenticeHall,1992.
3. G.J.KlirandT.A.Folger,"Fuzzy sets,Uncertainty andInformation", Pearson, 1st edition, 2015.
4. D.E.Goldberg, "GeneticAlgorithms", Pearson Education India, 1st edition, 2008.

Online Learning Resources:

1. https://onlinecourses.swayam2.ac.in/ntr24_ed08/preview

2. https://onlinecourses.nptel.ac.in/noc23_ge36/preview
3. https://onlinecourses.nptel.ac.in/noc22_hs59/preview

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code		L	T	P	C
25BHS04	ENGLISH FOR RESEARCH PAPER WRITING (Audit Course – I)	2	0	0	0
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Recall the key language aspects and structural elements of academic writing in research papers.

CO2. Explain the importance of clarity, precision, and objectivity in research writing.

CO3. Apply critical reading strategies and advanced grammar skills to analyze and write research papers.

CO4. Analyze research articles and identify the strengths and limitations of different methodologies.

CO5. Evaluate research papers to check for plagiarism, structure, clarity, and language accuracy.

CO6. Evaluate the effectiveness of different language and technology tools in research writing, including AI-assisted tools and plagiarism detection software.

CO7. Develop a well-structured research paper that effectively communicates complex ideas

UNIT – I: Fundamentals of Academic English

Academic English - MAP (Message-Audience-Purpose) - Language Proficiency for Writing - Key Language Aspects - Clarity and Precision - Objectivity - Formal Tone - Integrating References - Word order - Sentences and Paragraphs - Link Words for Cohesion - Avoiding Redundancy / Repetition - Breaking up long sentences - Structuring Paragraphs - Paraphrasing Skills – Framing Title and Sub-headings.

UNIT – II: Reading Skills for Researchers

Reading Academic Texts - Critical Reading Strategies - Skimming and Scanning - Primary Research Article vs. Review Article - Reading an Abstract - Analyzing Research Articles - Identifying Arguments - Classifying Methodologies - Evaluating Findings - Making Notes

UNIT – III: Grammar Refinement for Research Writing

Advanced Punctuation Usage - Grammar for Clarity - Complex Sentence Structures - Active-Passive Voice - Subject-Verb Agreement - Proper Use of Modifiers - Avoiding Ambiguous Pronoun References - Verb Tense Consistency - Conditional Sentences.

UNIT – IV: Mastery in Refining Written Content/Editing Skills

Effective Revisions - Restructuring Paragraph - Editing vs Proofreading, Editing for Clarity and Coherence - Rectifying Sentence Structure Issues - Proofreading for Grammatical Precision – Spellings - Tips for Correspondence with Editors - Critical and Creative Phases of Writing

UNIT – V: Technology and Language for Research

Digital Literacy and Critical Evaluation of Online Content - Technology and Role of AI in Research Writing – Assistance in Generating Citations and References - Plagiarism and Ethical Considerations – Tools and Awareness – Fair Practices

Suggested Reading:

1. Bailey. S. Academic Writing: A Handbook for International Students. London and
2. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

Reference Books:

1. Craswell, G. Writing for Academic Success, Sage Publications, 2004.
2. Peter Elbow, Writing With Power, E-book, Oxford University Press, 2007
3. Oshima, A. & Hogue, A. Writing Academic English, Addison-Wesley, New York, 2005.
4. Swales, J. & C. Feak, Academic Writing for Graduate Students: Essential Skills and Tasks. Michigan University Press, 2012.
5. Goldbort R.Writing for Science, Yale University Press (available on Google Books), 2006.
6. Day R.How to Write and Publish a Scientific Paper, Cambridge University Press, 2006

Online Learning Resources:

1. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ge04/

2. https://onlinecourses.swayam2.ac.in/ntr24_ed15/preview

3."Writing in the Sciences" – Stanford University (MOOC on Coursera) https://www.coursera.org/learn/sciwrite

4. Academic Phrasebank – University of Manchester http://www.phrasebank.manchester.ac.uk

5.OWL (Online Writing Lab) – Purdue University, https://owl.purdue.edu *(Resources on APA/MLA formats, grammar, structure, paraphrasing)*

6. Zotero or Mendeley (Reference Management Tools) – Useful for managing citations and sources.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	DISASTER MANAGEMENT (Audit Course – I)	L	T	P	C
25BST11		2	0	0	0
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. **Define and distinguish** between hazards and disasters, and explain their types, nature, and impacts.

CO2. **Identify and map** disaster-prone areas in India and understand the epidemiological consequences of disasters.

CO3. **Assess** the economic, social, and ecological repercussions of major natural and man-made disasters.

CO4. **Demonstrate knowledge** of disaster preparedness tools such as remote sensing, meteorological data, risk evaluation, and community awareness.

CO5. **Apply** risk assessment methods and propose disaster risk reduction strategies at local, national, and global levels.

CO6. **Formulate and evaluate** structural and non-structural disaster mitigation strategies, with emphasis on Indian programs and emerging trends.

UNIT - I

Introduction:

Disaster - Definition, Factors and Significance - Difference Between Hazard and Disaster - Natural and Man-made Disasters - Difference, Nature, Types and Magnitude -Disaster Prone Areas in India - Study of Seismic Zones - Areas Prone to Floods and Droughts, Landslides and Avalanches - Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami - Post-Disaster Diseases and Epidemics.

UNIT - II

Repercussions of Disasters and Hazards:

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III

Disaster Preparedness and Management:

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT - IV

Risk Assessment Disaster Risk:

Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT - V

Disaster Mitigation:

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation .Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

SUGGESTED READING:

1. Gupta, H. K. Disaster Management. Universities Press, 2003.
2. Singh, R. B. Natural Hazards and Disaster Management. Rawat Publications, 2006.

REFERNCE BOOKS:

1. Coppola, D. P. (2020). Introduction to International Disaster Management (4th ed.). Elsevier.
2. Shaw, R., & Izumi, T. (2022). Science and Technology in Disaster Risk Reduction in Asia. Springer.
3. Wisner, B., Gaillard, J. C., & Kelman, I. (2021). Handbook of Hazards and Disaster Risk Reduction and Management (2nd ed.). Routledge.
4. Saini, V. K. (2021). Disaster Management in India: Policy, Issues and Perspectives. Sage India.
5. Kelman, I. Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes, Oxford University Press, 2022
6. Sahni, P. & Dhameja, A. Disaster Mitigation: Experiences and Reflections. Prentice Hall of India, 2004.

ONLINE RESOURCES:

1. National Disaster Management Authority (NDMA), India: https://ndma.gov.in – official guidelines, reports, and policy frameworks.
2. United Nations Office for Disaster Risk Reduction (UNDRR): https://www.undrr.org – Sendai Framework, global risk reduction strategies.

3. Global Disaster Alert and Coordination System (GDACS): https://www.gdacs.org – real-time disaster alerts.
4. World Health Organization (WHO) – https://www.who.int/emergencies – disaster-related health guidelines.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (Audit Course – I)	L	T	P	C
25BHS05		2	0	0	0
	Semester	I			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Define and explain the concept of traditional knowledge, its nature, characteristics, and scope.

CO2. Understand the need for protecting traditional knowledge and its significance in the global economy.

CO3. Explain the legal framework and policies related to traditional knowledge protection.

CO4. Apply traditional knowledge in different sectors, such as engineering, medicine, agriculture, and biotechnology.

CO5. Analyze the importance of traditional knowledge in various contexts, including its historical impact and social change.

CO6. Analyze the relationship between traditional knowledge and intellectual property rights, including patents and non-IPR mechanisms.

UNIT – I : Introduction to traditional knowledge - Definition, Nature and characteristics, scope and importance - Kinds of traditional knowledge - Physical and social contexts in which traditional knowledge develop - Historical impact of social change on traditional knowledge systems - Indigenous Knowledge (IK) – Characteristics - traditional knowledge vis-à-vis indigenous knowledge -Traditional knowledge Vs western knowledge, traditional knowledge vis-à-vis formal knowledge.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand the concept of traditional knowledge.
- Contrast and compare characteristics, importance& kinds of traditional knowledge.
- Analyze physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

UNIT – II: Protection of traditional knowledge- Need for protecting traditional knowledge - Significance of TK Protection - Value of TK in global economy - Role of Government to harness TK.

Learning Outcomes:

At the end of the unit the student will able to:

- Know the need of protecting traditional knowledge.
- Apply significance of TK protection.
- Analyze the value of TK in global economy.
- Evaluate role of government.

UNIT – III : Legal frame work and TK - A)The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 - Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act) – B)The Biological Diversity Act 2002 and Rules 2004 - the protection of traditional knowledge bill, 2016 - Geographical Indicators Act 2003.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand legal frame work of TK.
- Contrast and compare the ST and other traditional forest dwellers.
- Analyze plant variant protections.
- Understand the rights of farmers forest dwellers.

UNIT – IV: Traditional knowledge and Intellectual property - Systems of traditional knowledge protection - Legal concepts for the protection of traditional knowledge - Certain non-IPR mechanisms of traditional knowledge protection - Patents and traditional knowledge - Strategies to increase protection of traditional knowledge -Global legal FORA for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand TK and IPR.
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

UNIT – V : Traditional knowledge in different sectors - Traditional knowledge and Engineering - Traditional medicine system - TK and Biotechnology - TK in Agriculture - Traditional societies depend on it for their food and healthcare needs - Importance of conservation and sustainable development of environment - Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:

At the end of the unit the student will be able to:

- Know TK in different sectors.
- Apply TK in Engineering.
- Analyze TK in various sectors.

- Evaluate food security and protection of TK in the country

TEXT BOOKS:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. *Introduction to Indian Knowledge System: Concepts and Applications*, PHI Learning Pvt.Ltd. Delhi, 2022.
2. Basanta Kumar Mohanta and Vipin Kumar Singh,*Traditional Knowledge System and Technology in India,* PratibhaPrakashan 2012.

REFERENCE BOOKS:

1. Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
2. Kak, S.C. "On Astronomy in Ancient India", Indian Journal of History of Science, 22(3), 1987
3. Subbarayappa, B.V. and Sarma, K.V. *Indian Astronomy: A Source Book*, Nehru Centre, Mumbai, 1985.
4. Bag, A.K. *History of Technology in India*, Vol. I, Indian National Science Academy, New Delhi, 1997.
5. Acarya, P.K. *Indian Architecture*, Munshiram Manoharlal Publishers, New Delhi, 1996.
6. Banerjea, P. *Public Administration in Ancient India*, Macmillan, London, 1961.
7. Kapoor Kapil, Singh Avadhesh,*Indian Knowledge Systems Vol – I & II,* Indian Institute of Advanced Study, Shimla, H.P., 2022.

E-Resources:

1. https://www.youtube.com/watch?v=LZP1StpYEPM 2.http://nptel.ac.in/courses/121106003/

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code		L	T	P	C
25BPE12	ADVANCED POWER ELECTRONICS	3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the characteristics of various power semiconductor devices.

CO2. Analyze the operation of various types of resonant pulse inverters, resonant converters and multi inverters.

CO3. Analyze various pulse modulation and advanced modulation techniques available.

CO4. Apply the above concepts to choose appropriate device for particular topology.

UNIT – I High-Power semiconductor devices:

Introduction – High Power Switching Devices – Diodes – Silicon-Controlled Rectifier (SCR) – Gate Turn Off (GTO) Thyristor –Gate Commutated Thyristor (GCT) –Insulated Gate Bipolar Transistor (IGBT) –Other Switching Devices –Operation of Series Connected Devices –Main Causes of Voltage Unbalance –Voltage Equalization for GCTs– Voltage Equalization for IGBTs.

UNIT II Resonant pulse Inverters:

Resonant pulse inverters–Series resonant inverters Series resonant inverters with unidirectional and bidirectional switches-Analysis of half bride resonant inverter- Evaluation of currents and Voltages of a simple resonant inverter– Analysis of half bridge and full bridge resonant inverter with bidirectional switches– Frequency response of series resonant inverter for series loaded inverter and parallel resonant inverters–Voltage control of resonant inverters- Class-E resonant inverter–Class-E resonant rectifier- Evaluation of values of C and L for class E inverter and Class E rectifier – Numerical problems

UNIT III Resonant Converters:

Resonant converters- Zero current switching resonant converters – L type - M type– Zero voltage Switching resonant converters – comparison between ZCS and ZVS resonant converters- Two quadrant ZVS resonant converters – Resonant dc link inverters- Evaluation of L and C for zero current switching inverter – Numerical problems.

UNIT IV Multilevel Inverters-I:

Sinusoidal PWM –Modulation Scheme –Harmonic Content –Over modulation– Third HarmonicInjectionPWM–SpaceVectorModulation–SwitchingStates–SpaceVectors–DwellTimeCalculation– Modulation Index – Switching Sequence– Spectrum Analysis –Even-Order Harmonic Elimination – Discontinuous Space Vector Modulation– H-Bridge Inverter– Bipolar Pulse Width Modulation – Uni polar Pulse Width Modulation.

UNIT V Multilevel Inverters-II:

Multilevel Inverter Topologies–CHB Inverter with Equal DC Voltage–H-Bridges with Unequal DC Voltages -

Carrier Based PWM Schemes – Phase-Shifted Multicarrier Modulation–Level-Shifted Multicarrier Modulation– Comparison Between Phase and Level Shifted PWM Schemes –Staircase Modulation – Diode Clamped Multilevel Inverters – Three Level Inverter – Converter Configuration – Switching State – Commutation–SpaceVectorModulation–StationarySpaceVectors–DwellTimeCalculation– Relationship Between V ref Location and Dwell Times – Switching Sequence Design – Inverter Output Wave forms and Harmonic Content– Even-Order Harmonic Elimination.

TEXTBOOKS:

1. Mohammed H.Rashid, “Power Electronics”, Pearson Education, 4th edition, 2017.
2. NedMohan, Tore M.Undel and and William P.Robbind, “Power Electronics”, John wiley &Sons, 3rd edition, 2007.

REFERENCE BOOKS:

1. DanielW. Hart, “PowerElectronics”,McGrawHillPublications,1st edition, 2010
2. V.R.Moorthi, “Power Electronics Devices, Circuits and Industrial applications”, Oxford University Press, 2005Dr.P.S.Bimbhra, “Power Electronics”, Khanna Pubishers, 2006.
3. Philip T.Krein, “Elements of Power Electronics”, Oxford University Press, 2nd edition, 2014.
4. BinWu, “High-Power Converters and AC Drives”, IEEE Press Ajohn Wiley &Sons, 2ndedition, 2017.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	FACTS CONTROLLERS	L	T	P	C
25BPE13		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand various control techniques for the purpose of identifying the scope and for selection of specific FACTS controllers.

CO2. Remember different types of controllable VAR generation and variable impedance techniques.

CO3. Design simple converters using FACTS controllers..

CO4. Understand the operation of Unified Power Controller and Hybrid Arrangements.

UNIT – I Facts Concepts, VSI and CSI:

Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers. Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

UNIT II Shunt Compensation:

Objectives of shunt compensation - Methods of controllable VAR generation - Variable impedance type static VAR generators - switching converter type VAR generators - hybrid VAR generators – Comparison of SVC and STATCOM.

UNIT III Series Compensation:

Objectives of series compensation – GTO Thyristor Controlled Series Capacitor (GCSC) - Thyristor Switched Series Capacitor (TSSC) - Thyristor Controlled Series Capacitor (TCSC) - Control schemes for TCSC, TSSC and TCSC.

UNIT IV Unified Power Flow Controller (UPFC):

Introduction - The Unified Power Flow Controller - Basic Operating Principles - Conventional Transmission Control Capabilities - Independent Real and Reactive Power Flow Control - Control Structure - Basic Control System for P and Q Control - Hybrid Arrangements: UPFC With a Phase Shifting Transformer.

UNIT V Interline Power Flow Controller (IPFC):

Introduction, basic operating principle and characteristics of IPFC, control structure, practical and application considerations, generalized and multifunctional fact controllers

TEXTBOOKS:

1. Understanding FACTS – Concepts and technology of Flexible AC Transmission systems, Narain G. Hingorani, Laszlo Gyugyi, IEEE Press, WILEY, 1st Edition, 2000, Reprint 2015.
2. FACTS Controllers in Power Transmission and Distribution, Padiyar K.R., New Age International Publishers, 1st Edition, 2007.

REFERENCE BOOKS:

1. Flexible AC Transmission Systems: Modeling and Control, Xiao – Ping Zhang, Christian Rehtanz, Bikash Pal, Springer, 2012, First Indian Reprint, 2015.
2. FACTS – Modeling and Simulation in Power Networks, Enrigue Acha, Claudio R. Fuerte – Esquival, Huge Ambriz – perez, Cesar Angeles – Camacho, WILEY, 1st edition, 2004.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	AC DRIVES (PE-III)	L	T	P	C
25BPE14		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the working principle and operation of AC and Special purpose motor Drives.

CO2. Formulate the control strategies for VSI fed sensor-less induction motor drives, CSI fed induction motor drives, and VSI fed poly– phase induction motors.

CO3. Implement control schemes for PMSM, BLDC and Switched Reluctance Motor drives.

CO4. Analyze highperformanceinductionmotordrivesusingtheprinciplesofScalarcontroland develop vector control, direct torque control and introduction of five phase induction motor drive.

UNIT – I Induction Motor drives:

Control of Induction Motor Drive - Scalar control of induction motor-Principle of vector control and field orientation Sensor less control and flux observers - Direct torque and flux control of induction motor Multilevel converter-fed induction motor drive - Utility friendly induction motor drive Implementation of V/f control with slip compensation scheme, Review of dq0 model of 3 – IM with simulation studies..

UNIT II Control techniques of IM drives:

Direct vector control -Indirect vector control with feedback-Indirect vector control with feed–forward- Indirect vector controlling various frames of reference -Decoupling of vector control with feed forward compensation - sensor less control of IM, Direct Torque Control of IM - Speed control of wound induction motor with rotor side control - introduction to five phase induction motor drives.

UNIT III Synchronous Motor Drives:

Control of Synchronous Motor - Self controlled synchronous motor – Vector control of synchronous motor – Cycloconverter fed synchronous motor drive -Control of synchronous reluctance motor.

UNIT IV Permanent Magnet Drives:

PM Synchronous motors: Types – Construction - operating principle-Expression for torque - Model of PMSM - Implementation of vector control for PMSM - BLDC drives- PMDC motor drives.

.UNIT V SRM Drive & Its Controller:

Construction - Operating Principle -Torque expression-SRM configuration and its controller design – converter topologies – control strategies – Sensor less control. Principles of fuzzy logic control and neural network– Design methodology and block diagram implementation of DC drive and vector controlled induction motor. Recent trends in fuzzy control of electrical drives. MATLAB simulation – Fuzzy logic speed control of three phase induction motor drive –Adaptive speed control for induction motor drives using neural network.

TEXTBOOKS:

1. Modern Power Electronics & AC Drives – B.K. Bose, Pearson, Second edition,2005.
2. R.Krishnan, "Electric Motor Drives: Modelling, Analysis and Control", Pearson, 1st edition, 2015.
3. FACTS Controllers in Power Transmission and Distribution, Padiyar K.R., New Age International Publishers, 1st Edition, 2007.

REFERENCE BOOKS:

1. Bin-Wu, "High– Power Converters and AC Drives", IEEE Press, John Wiley &Sons, 2nd edition, 2017.
2. M.B.Patil,V.Ramanarayanan,V.T.Ranganathan,"SimulationofPowerElectronicCircuits",Narosa Publications,2009, Reprint 2013.
3. Relevant Papers from journals.
4. P.C. Krause,O. Wasynczuk,S. D. Sudhoff and Steven D. Pekarek, "Analysis of Electric Machinery", Wiley, IEEE Press, 3rd edition, 2013.
5. P. S. Bhimbra, "Generalized Theory of Electric Machines", Khanna Publication, 7th edition, 2021.
6. Ion Boldea , Syed A. Nasar "Electric Drives 3rd Edition, Kindle Edition" 3rd Edition,2016.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ADVANCED POWER SEMICONDUCTOR DEVICES AND PROTECTION (PE-III)	L	T	P	C
25BPE15		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. To understand the characteristics of various power semiconductor devices such as BJT, MOSFET, GTO and IGBT.

CO2. Apply the above to understand the various types of emerging power semi conductor devices

CO3. To analyze the concept of Electro Magnetic Interference, Noise, their sources and effect of them on electronic equipment

CO4. To design protection devices and circuits like heat sinks, voltage and current protection circuits.

UNIT – I BJTS &Power MOSFET:

Introduction- Vertical power transistor structures- I-V characteristics- Operation – Switching characteristics- Break down voltages-Second break down- ON state losses- Safe Operation Areas- Design of drive circuits for BJTs- Snubber circuits for BJTs and Darling tons. Power MOSFETs - Introduction-Basic structures- I-V characteristics- Physics of device operation- Switching Characteristics-Operation limitations – Safe Operating Areas- Design of gate drive circuits-Snubber circuits.

UNIT II GTO & IGBT:

Introduction- Basic structures- I-V characteristics- Physics of device operation-GTO switching Characteristics- Snubber circuits- Over protection of GTOs. Insulated Gate Bipolar Transistors - Introduction- Basic structures- I-V characteristics-Physics of device operation- Latchin IGBT switching Characteristics-Device limits and Safe Operating Areas- Snubber circuits.

UNIT III Emerging devices and circuits:

Introduction-Power junction field effect transistors- Field Controlled Thyristor- JFET based devices Versus other power devices- MOS controlled Thyristors- High voltage integrated circuits- New Semi conductor materials- Introduction to Gallium Nitride and Silicon Carbide Devices.

UNIT IV Passive components and electromagnetic compatibility:

Introduction- Design of inductor- Transformer design- Selection of capacitors and resistors-Current Measurements-Heat sinking circuit layout–Electromagnetic Interference(EMI)- Sources of EMI Electromagnetic Interference in Power Electronic Equipment.

.UNIT V Noise & Protection Devices:

Noise sources in SMPS- Diode Storage Charge Noise- Noise generated due to switching-Common noises sources in SMPS- Noises Due to High frequency transformer- Measurement of Noise-Minimizing EMI-EMI shielding- EMI standards. Protection of Devices& Circuits - Cooling & Heat sinks – Thermal modeling of power switching devices- Snubber circuits – Reverse recovery transients – Supply and load side transients –Voltage protections– Current.

TEXTBOOKS:

1. M.H.Rashid, “Power Electronics Circuits, Devices and Applications” Pearson Education, 4th edition, 2017.
2. Mohanand Undel and, “Power Electronics Converters, Applications and Design”, JohnWiley &Sons,3rd edition, 2007.
3. B.W.Williams,“Power Electronics Circuit Devices, Driversand Applications and passive components”, MC Graw hill higher education, 2nd edition, 1992..

REFERENCE BOOKS:

1. Vithayathil, “Power Electronics Circuits”, MC Graw Hill Education, Indian edition, 2017.
2. W.C.Lander, “Power Electronics Circuits”, Tata MCGraw Hill, 3rdEdition, 1995.
3. LoganathanUmanand, “Power Electronics: Essentials and Applications”, Wiley India Pvt. Ltd, 2009.

Online Learning Resources:

1. **http://nptelonlinecourses.iitm.ac.in/courses/108104011/**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	APPLICATIONS OF POWER CONVERTERS (PE-III)	L	T	P	C
25BPE16		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. To understand the power electronic application requirements.

CO2. To identify the suitable power converter from the available configurations.

CO3. To develop the improved power converters for any stringent application requirements.

CO4. To design a bi-directional DC-DC converters for charge/discharge applications.

UNIT – I Inverters for Induction Heating :

For induction cooking – high frequency inverters for induction heating - Induction hardening – Melting – Electric welding control – Welding applications.

UNIT II Power Converters for Lighting, pumping and refrigeration Systems:

Electronic ballast - LED power drivers for indoor and outdoor applications - PFC based grid fed LED drivers – PV / battery fed LED drivers –Pv fed power supplies for pumping/refrigeration - Applications.

UNIT III High Voltage Power Supplies:

Power supplies for X-ray applications - Power supplies for radar applications-Power supplies for space applications.

UNIT IV Low voltage high current power supplies:

Power converters for modern microprocessor and computer load.

.UNIT V Bi-directional DC-DC (BDC) converters:

Electric traction - Automotive Electronics and charge/discharge applications -Line Conditioners and Solar Charge Controllers..

TEXTBOOKS:

1. Ali Emadi, A. Nasiri and S. B. Bekiarov, “Uninterruptible Power Supplies and Active Filters”, CRC Press, 1st edition, 2005.
2. M. Ehsani,Y. Gao, E. G. Sebastien and A. Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles”, Standards media, 2ndEdition,2009.

REFERENCE BOOKS:

1. William Ribbens, “Understanding Automotive Electronics”, BH, 8th edition, 2003.

2. N. Mohan, T.M. Undeland and W.P. Robbins, “Power Electronics Converters, Applications and design”, John Wiley and Sons, 3rd edition, 2007.
3. M. H. Rashid, “Power Electronics Circuits, Devices and Applications”, Pearson publications, 3rd Edition, 2004.

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	POWER QUALITY (PE- IV)	L	T	P	C
25BPE17		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the fundamentals & terminology of power quality.

CO2. Apply the concept of power frequency disturbances, types of transients & transient waveforms.

CO3. Analyze the harmonic methodology & Electromagnetic Interference concepts.

CO4. Remember the necessity of grounding and methods of grounding

CO5. Understand different techniques of measuring & solving power quality problems.

UNIT – I Introduction to Power Quality :

Definition of Power Quality - Power Quality Progression - Power Quality Terminology - Power Quality Issues– Responsibilities of Power Suppliers and Users-Power Quality Standards..

UNIT II Power Frequency:

Disturbance & Transients

Introduction to Power Frequency Disturbance - Common Power Frequency Disturbances – Characteristics of Low Frequency Disturbances - Voltage Tolerance Criteria- ITIC Graph - Introduction to Transients -Transient System Model - Examples of Transient Models and Their Response - Power System Transient Modeling-Types and Causes of Transients -Examples of Transient Waveforms..

UNIT III Harmonics & Electromagnetic Interference (EMI):

Definition of Harmonics - Harmonic Number (h) - Odd and Even Order Harmonics - Harmonic Phase Rotation and Phase Angle - Voltage and Current Harmonics - Individual and Total Harmonic Distortion -Harmonic Signatures - Effect of Harmonics On Power System Devices - Guidelines For Harmonic Voltage and Current Limitation - Harmonic Current Mitigation - Introduction to EMI - Frequency Classification –Electrical Fields- Magnetic Fields-EMI Terminology-Power Frequency Fields-High Frequency Interference-EMI Susceptibility- EMI Mitigation-Cable Shielding-Health Concerns of EMI.

UNIT IV Grounding and bonding:

Introduction to Grounding and Bonding-Shock and Fire Hazards-NEC Grounding Requirements-Essentials of a Grounded System-Ground Electrodes-Earth Resistance Tests-Earth Ground Grid Systems-Power Ground System-Signal Reference Ground(SRG)-SRG Methods-Single and Multipoint Grounding –Ground Loops – Electro chemical Reaction -Examples of Grounding Anomalies..

.**UNIT V Measuring and Solving Power Quality Problems:**

Introduction to Power QualityMeasurements-Power QualityMeasurement Devices-Power Quality Measurements Test Locations-Test Duration-Instrument Setup- Instrument Guidelines – Power quality mitigating concepts and devices.

TEXTBOOKS:

1. Power quality by C. Sankaran, CRC Press, 1st Edition, 2001.
2. Electrical Power Systems Quality, Roger C. Dugan, Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty, 2nd Edition, TMH Education Pvt. Ltd, 1996.

REFERENCE BOOKS:

1. Understanding Power quality problems by Math H. J.Bollen IEEE Press, 1st edition, 2000.
2. Power quality enhancement using custom power devices by Arindam, Ghosh, Gerard Ledwich, Kluwer, Academic publishers, 1st edition, 2002.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	EV CHARGING INFRASTRUCTURE & TECHNOLOGY (PE-IV)	L	T	P	C
25BPE18		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Analyse the impact of EV charging on power grid.

CO2. Design and analyse the various charging infrastructures and their selection and sizing.

CO3. Evaluate the various charging methodologies and analyse their performances.

CO4. Design the charger specifications along with study and selection of communication protocol for various charging ports.

UNIT-I EV Charging Systems

Introduction, EV charging options and infrastructure, energy, economic and environmental considerations, Impact of EV charging on power grid-distribution system, effect of EV charging on generation and load profile, Smart charging technologies, Identification of EV demand, EV penetration level for different scenarios, classification based on penetration level. General safety requirement for electric vehicle charging stations: IS/IEC 62305.

UNIT-II Electric Vehicle Charger Design and Infrastructure Management

Types of charging stations and Charging Infrastructure, Battery Swapping Station, Move-and-charge zone. AC charging and DC charging - On board and off board charger specification - EVSE technical specification and charging time calculation - Selection and sizing of fast and slow charger (AC & DC) – AC Pile Charger, DC Pile Charger. Charging – Interoperability of chargers, impact of battery life due to chargers.

UNIT-III Smart & Sustainable Electric Vehicle Charging Infrastructure using Renewable Energy

Renewable Energy based Electric Vehicle Charging Station - Calculation and Selection - Components of Charging Station - Earth protection system for charging stations – Fire & safety aspects of charging stations, EV impacts on system demand: dumb charging, multiple tariff charging, smart charging, burp charging, negative pulse charging, random charging, high speed/fast charging, and different case studies of charging approach.

UNIT-IV Communication Technologies for Electric Vehicle Charging Infrastructure

Selection of EVSE Communication Protocol (PLC / Ethernet / Modbus/ CAN Module) – Communication gateway - Specification of open charge point protocol (OCCP 1.6/2.0) - Bharat

DC001 & AC001 Charger specification - Communication between AC charger and EV - Selection of DC charger connector GB/T, CHAdeMO, CCS-1 and CSS-2 - Communication methodology of DC fast chargers**.**

UNIT-V IoT-Based Electric Vehicle Technologies for Electric Vehicle Systems

IoT based communication supporting systems for performance measures of EVs. Recent advancements in Vehicle to Grid (V2G) and Grid to Vehicle (G2V) technologies – Case Studies on EV charging. Reliability of charging stations – predicative approach and analyzing for long-term maintenance free operation. Significance of bathtub curve, reliability prediction based on working condition.

TEXTBOOKS:

1. Alam, M. S., Pillai, R. K., & Murugesan, N. (Eds.). (2022). Developing Charging Infrastructure and Technologies for Electric Vehicles. IGI Global.
2. A. Khajepour, S. Fallah and A. Goodarzi, "Electric and Hybrid Vehicles Technologies, Modeling and Control: A Mechatronic Approach", John Wiley & Sons Ltd, 2014.

REFERENCE BOOKS:

1. Emadi, A. (Ed.), Miller, J., Ehsani, M., "Vehicular Electric Power Systems" Boca Raton, CRCPress, 2003
2. Husain, I. "Electric and Hybrid Vehicles" Boca Raton, CRC Press, 2010.
3. Larminie, James, and John Lowry, "Electric Vehicle Technology Explained" John Wiley and Sons,2012
4. Tariq Muneer and Irene IllescasGarcía, "The automobile, In Electric Vehicles: Prospects and Challenges", Elsevier, 2017.
5. Sheldon S. Williamson, "Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles", Springer, 2013.

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(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	DIGITAL SIGNAL PROCESSORS AND APPLICATIONS (PE-IV)	L	T	P	C
25BVL31		3	0	0	3
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand the basic and advanced concepts of different DSP Processors..

CO2. Apply the basic and advanced concepts in order to develop various programmable based DSP applications.

CO3. Analyze the operation and performance of DSP based designs for various real time issues.

CO4. Design / create DSP based controllers and processors for various simulation /real time based applications.

UNIT – I DSP Controller TMSLF2407 :

Introduction to the TMSLF2407 DSP Controller- Brief Introduction to Peripherals - Types of Physical Memory-Software Tools.

C2XX DSP CPU and instruction set- Introduction to the C2xx DSP Core and Code Generation – The Components of the C2xx DSP Core - Mapping External Devices to the C2xx Core and the Peripheral Interface -System Configuration Registers –Memory -Memory Addressing Modes -Assembly Programming Using the C2xxDSP Instruction Set.

UNIT II Data Transfer and Communication:

Parallel and Serial Data Transfer- Pin Multiplexing(MUX) and General Purpose I/O Overview- Multiplexing and General Purpose I/O Control Registers - Using the General Purpose I/O Ports, Serial Communication.

UNIT III DSP Controller TMS320LF24:

Interrupt system of TMS320LF2407- Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers- Initializing and Servicing Interrupts in Software- real time control with interrupts.

The analog-to-digital converter (ADC)-ADC Overview- Operation of the ADC and programming modes.

UNIT IV DSP Controller Applications:

Event Managers (EVA, EVB)- Overview of the Event Manager (EV) - Event Manager Interrupts – General Purpose (GP) Timers- Compare Units - Capture Units and Quadrature Encoded Pulse (QEP) Circuitry – General Event Manager Information-PWM Signal Generation with Event Managers and

interrupts, Measurement of speed with Capture Units, Implementation of Space Vector Modulation with DSPTMSLF2407A.

UNIT V Field Programmable Gate Array:

Field Programmable Gate Arrays- Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Configurable logic Blocks (CLB), Input/output Block (IOB) – Programmable Interconnect Point (PIP)- HDL programming –overview of Spartan 6 & ISE Design Suite, Implementation of PWM technique with SPARTAN-6 FPGA.

TEXTBOOKS:

1. S Hamid A.Tolyat, "DSP based Electromechanical Motion Control", CRCpress,1st edition, 2004.
2. Wayne Wolf, "FPGAbasedsystemdesign",Prenticehall,1st edition, 2004

REFERENCE BOOKS:

1. Application Notes from the website of Texas Instruments..
2. Spartan-6FPGAConfigurableLogicBlock,2010
3. XilinxSpartan6Datasheets.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ELECTRIC DRIVES LAB	L	T	P	C
25BPE19		0	0	4	2
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. To get practical training and hand on for the hardware and software application used in electric drives.

CO2. To understand the practical problems and limitations of the methods used in electric drives.

CO3. Apply and analyze various modulation techniques on different motor drives.

CO4. Analyze performance of Induction Motors when different converters are connected.

LIST OF EXPERIMENTS:

1. Torque-Speed characteristics of DC motor using DC chopper.
2. Symmetrical angle control of1-phaseACmotorconnectedtoACvoltagecontroller
3. Single-Phase dual converter connected separately excited DC motor drive
4. Speed control of3-phase induction motor using open-loop V/f control technique
5. Torque-Speed characteristics of a 3-phase induction motor using IM-Im comprehensive drive system
5. Study of a Neutral Point Clamped inverter fed three-phase induction motor drive
6. PulsewidthmodulationcontrolofI-phaseACmotorconnectedtoACvoltagecontroller
7. Torque-Speedcharacteristicsofa3- phase Permanent Magnet Synchronous Motor (PMSM) using PMSM- IM comprehensive drive system.
8. Torque-speedcharacteristicsofa SeparatelyExcitedDCmotorDrivefedbyatwo-pulsecentre- tapped thyristor rectifier.
9. Torque-speedcharacteristicsofa6-pulsefullycontrolledrectifierfedSeparatelyExcitedDCmotorDrive
10. Study of a four-quadrant separately excited DC motor drive fed by dual- converter with circulating current control
11. Study Class-D commutated chopper fed separately Excited DC motor Drive
12. Verification ofspectralperformanceofa3-PhVSIwith V/Hz control of3-Ph IM drives
13. Torque speed characteristics of a 3-Phinduction motor fed by a3-PhVSI

14. ImplementationofcentrespacedspacevectormodulationwithDSPforV/Hzcontrolofinduction motor drives.
15. ImplementationofdiscontinuousspacevectormodulationwithDSPforV/Hzcontrolofinduction motor drives.

Note: Any ten experiments out of the list provided.

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	FACTS DEVICES & SIMULATION LAB	L	T	P	C
25BPE20		0	0	4	2
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand Load balancing using compensators.

CO2. Apply load balancing using Compensators..

CO3. Analyse load flow incorporating SVC & STATCOM.

CO4. Develop a Simulation model for STATCOM & UPFC.

LIST OF EXPERIMENTS:

1. Voltage regulation using shunt and series compensation
2. Load balancing in power system network using compensators
3. Simulation of TCSC
4. Voltage profile improvement using SVC
5. Voltage profile improvement using STATCOM
6. Transient Stability enhancement using STATCOM.
7. Simulation of UPFC with mathematical models
8. Load flow incorporating SVC
9. Load flow incorporating STATCOM
10. Simulation of DVR
11. Transmission Line Characteristics (P vs δ, Q vs δ, P vs Distance, Q vs Distance and V vs Distance) with and without Compensation
12. Sizing- simulation and operation of TCR and FC-TCR for a transmission line fed by an ac supply and feeding

(a) Resistive/inductive/capacitive load one at a time

(b) A load which can have leading as well as lagging behavior

13. Sizing- simulation and operation of TCSC for a transmission line fed by an ac supply and feeding

(a) Resistive/inductive/capacitive load one at a time

(b) A load which can have leading as well as lagging behavior

14. Sizing- simulation and operation of STATCOM for a transmission line fed by an ac supply and feeding

(a) Resistive/inductive/capacitive load one at a time

(b) A load which can have leading as well as lagging behavior

15. Sizing- simulation and operation of SSSC for a transmission line fed by an ac supply and feeding

(a) Resistive/inductive/capacitive load one at a time

(b) A load which can have leading as well as lagging behavior

Web Sources: https://www.vlab.co.in

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	QUANTAUM TECHNOLOGIES AND APPLICATIONS (MC)	L	T	P	C
25BCS22		2	0	0	2
	Semester	II			

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)

M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	COMPREHENSIVE VIVA VOCE		T	P	C
25BPE21		0	0	0	2
	Semester	II			

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	PEDAGOGY STUDIES (Audit Course –II)	L	T	P	C
25BMB02		2	0	0	0
Semester		II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Whatpedagogicalpracticesarebeingusedbyteachersinformalandinformalclassrooms in developing countries?

CO2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

CO3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT - I

Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and terminology Theories of learning, Curriculum, Teacher education. Conceptual frame work, Research questions. Overview of methodology and Searching.

UNIT - II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT - III

Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of th body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT - IV

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT - V

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Suggested Reading:

1. AckersJ, HardmanF (2001) Classroom interaction in Kenya in primary schools, Compare, 31 (2): 245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,Journalof
3. Curriculum Studies, 36 (3): 361-379.
4. Akyeampong (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
5. Akyeampong K, LussierK, PryorJ, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	YOGA FOR STRESS MANAGEMENT (Audit Course –II)	L	T	P	C
25BHS06		2	0	0	0
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Develop healthy mind in a healthy body thus improving social health also.

CO2. Improve efficiency.

UNIT - I

Definitions of Eight parts of yog. (Ashtanga)

UNIT - II

Yam and Niyam.

UNIT - III

Do`sand Don't'sin life.

i) Ahinsa, satya, astheya, bramhacharyaand aparigrahaii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT - IV

Asan and Pranayam

UNIT - V

i)Various yoga poses and their benefits for mind &body ii)Regularization of breathing techniques and its effects-Types of pranayam

Suggested Reading:

1. Yogic Asanas forGroupTarining-Part-I": Janardan SwamiYogabhyasiMandal, Nagpur 2."Rajayogaor conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata.

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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (Audit Course –II)	L	T	P	C
25BHS07		2	0	0	0
	Semester	II			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.

CO2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity.

CO3. Study of Neetishatakam will help in developing versatile personality of students

UNIT - I

Neetisatakam- Holistic development of personality Verses-19,20,21,22 (wisdom)

Verses-29, 31, 32 (pride &heroism)

Verses-26, 28, 63, 65 (virtue)

UNIT - II

Neetisatakam- Holistic development of personality Verses-52,53,59(dont's)

Verses-71, 73, 75, 78(do's)

UNIT - III

Approach to day to day work and duties.

Shrimad Bhagwad Geeta: Chapter2-Verses41, 47, 48,

Chapter3-Verses13,21,27,35,Chapter6-Verses5,13,17,23,35, Chapter18-Verses45,46,48.

UNIT – IV

Statements of basic knowledge.

ShrimadBhagwadGeeta: Chapter2-Verses 56,62,68 Chapter12 -Verses13,14,15,16,17,18

Personality of Role model. Shrimad Bhagwad Geeta:

UNIT - V

Chapter2-Verses 17,Chapter3-Verses36,37,42, Chapter4-Verses18,38,39

Chapter18– Verses37,38,63

Suggested Reading:

1. “SrimadBhagavadGita ” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari’sThree Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

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(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	CONTROL & INTEGRATION OF RENEWABLE ENERGY SOURCES (PE-V)	L	T	P	C
25BPE22		3	0	0	3
	Semester	III			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Knowledge on different renewable energy sources and storage devices.

CO2. Recognize, model and simulate different renewable energy sources.

CO3. Analyze, model and simulate basic control strategies required for grid connection.

CO4. Implement a complete system for standalone/grid connected system.

UNIT – I Introduction to Electric Grid :

Electric grid introduction, Supply guarantee and power quality, Stability, Effects ofrenewableenergypenetrationintothegrid,Boundariesoftheactualgridconfiguration,Consumptionmodelsandpatterns ,static and dynamic energy conversion technologies, interfacing requirements.

UNIT II Dynamic Energy Conversion Technologies:

Introductiontodifferentconventionalandnonconventionaldynamicgenerationtechnologies,principle of operation and analysis of reciprocating engines, gas and micro turbines, hydro and wind based generation technologies ,control and integrated operation of different dynamic energy conversion devices

UNIT III Static Energy Conversion Technologies:

Introduction to different conventional and nonconventional static generation technologies, principle of operation and analysis of fuel cell, photovoltaic based generators, and wind based generation technologies, different storage technologies such as batteries, fly wheels and ultra capacitors, plug-in-hybrid vehicles, control and integrated operation of different static energy conversion devices.

UNIT IV Integrationof different Energy Conversion Technologies:

Control issues and challengesin Diesel, PV, wind and fuel cell based generators, PLL, Modulation Techniques, Dimensioning of filters, Linear and nonlinear controllers, predictive controllers and adaptive controllers, Fault-ride through Capabilities, Load frequency and Voltage Control.

UNIT V Field Programmable Gate Array:

Resources evaluation and needs, Dimensioning integration systems, Optimized integrated systems, Interfacing requirements ,integrated Control of different resources, Distributed versus Centralized Control, Synchro Converters, Grid connected and Islanding Operations,

Stability and protection issues ,load sharing, Cases studies.

TEXTBOOKS:

1. Ali Keyhani Mohammad Marwali and MinDai,“ Integration of Green and Renewable Energy in Electric Power System”, John Wiley publishing company, 1st edition, 2010..
2. S.Chowdhury,S.P.Chowdhury,P.Crossley,“MicrogridsandActiveDistributionNetworks”,IETPowerElectroni csSeries,2012.
3. G. Masters, “Renewable and Efficient Electric Power Systems ”,IEEE-Wiley Publishers, 2nd edition,2013

REFERENCE BOOKS:

1. Quing- Chang Zhong,“ Control of Power Inverters in Renewable Energy and Smart Grid Integration ”,Wiley,IEEEPress, 1st edition, 2013.
2. BinWu, Yongqiang Lang, Navid Zargari,“ Power Conversion and Control of Wind Energy Systems”, Wiley- IEEE Press, 1st edition, 2011.

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(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ENERGY STORAGE TECHNOLOGIES (PE - V)	L	T	P	C
25BPE23		3	0	0	3
	Semester	III			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understandtheroleofelectricalenergystoragetechnologiesinelectricityusage, hierarchy, demand for energy storage and valuation techniques..

CO2. Analyze the behavior and features of electrical energy storage systems.

CO3. Apply energy storage system concepts to electric vehicles.

CO4. Get knowledge about energy storage forecasting methods.

UNIT – I The roles of electrical energy storage technologies in electricity use :

Characteristicsof electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable, Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy..

UNIT II Types and features of energy storage systems:

Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES),Flywheel energy storage (FES), Electrochemical storage systems, Secondary batteries, Lead-Acid Batteries, Lithium-Ion Batteries, Flow batteries, Other Batteries in Development, Chemical energy storage, Hydrogen(H2), Synthetic natural gas (SNG), Electrical storage systems, Double- layer capacitors(DLC), Super conducting magnetic energy storage(SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

UNIT III Applications of EES:

Present status of applications, Utility use (conventional power generation, grid operation & service), Consumer use (uninterruptable power supply for large consumers), EES installed capacity worldwide, New trends in applications, Renewable energy generation, Smart Grid, Smart Micro grid, Smart House, Electric vehicles.

UNIT IV Management, Demand and Valuation of EES:

Management And Control Hierarchy of EES: Internal configuration of battery storage systems, External connection of EES systems, Aggregating EES systems and distributed generation(Virtual Power Plant),"Battery SCADA"–aggregation of many dispersed batteries.

Demand For Energy Storage: Growth in Variable Energy Resources, Relationship between balancing services and variable energy resources, Energy Storage Alternatives, Variable Generator Control, Demand Management, Market Mechanisms, and Longer Term Outlook.

Valuation techniques: Overview, Energy Storage Operational Optimization, Market Price Method, Power System Dispatch Model Method, Ancillary Service Representation, Energy Storage Representation, Survey of Valuation Results.

UNIT V Forecast of EES Market Potential by 2030:

EES market potential for overall applications, EES market estimation by Sandia National Laboratory (SNL), EES market estimation by the Boston Consulting Group (BCG), EES market estimation for Li-ion batteries by the Panasonic Group, EES market potential estimation for broad introduction of renewable energies, EES market potential estimation for Germany by Fraunhofer, Storage of large amounts of energy in gas grids, EES market potential estimation for Europe by Siemens, EES market potential estimation by the IEA, Vehicle to grid concept, EES market potential in the future.

TEXTBOOKS:

1. Paul Breeze, "Power System Energy Storage Technologies" Academic Press, 1st Edition, 2018.
2. Alfred Rufer, "Energy Storage: Systems and Components", CRC Press, 1st edition, 2017

REFERENCE BOOKS:

1. Robert A. Huggins, "Energy Storage Fundamentals, Materials and Applications", Springer, 2nd edition, 2015.

Online Learning Resources:

1. **www.ecofys.com/com/publications**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	HYBRID ELECTRIC VEHICLE ENGINEERING (PE-V)	L	T	P	C
25BPE24		3	0	0	3
	Semester	III			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Understand of hybrid electric vehicles and different energy to rage techniques

CO2. Analyzetheadvantagesanddisadvantagesofhybridelectricvehiclesoverconventionalvehicles and merits and demerits of hybrid electric trains over electrical trains

CO3. Discuss the electric population, motor drive technologies

CO4. Design of battery electric vehicles.

UNIT – I Introduction to Hybrid electric vehicles:

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance. History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II Hybrid Electric Drive-Trains:

Basic concept of electric traction, introduction to various electricdrive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III Electric Propulsion Unit:

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives ,drive system efficiency.

UNIT IV Energy Storage:

IntroductiontoEnergyStorageRequirementsinHybridandElectricVehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices**.**

UNIT V Energy Management Strategies:

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV)..

TEXTBOOKS:

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", CRCPress, 3rd edition, 2021.
2. MehrdadEhsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design ",CRC Press, 2nd edition, 2009.
3. AliEmadi, "AdvancedElectricDriveVehicles",CRCPress,1st edition, 2017.

REFERENCE BOOKS:

1. James Larminie, JohnLowry, "Electric Vehicle Technology Explained", Wiley, 2nd edition, 2012.
2. Sheldon S.Williamson, "Energy Management Strategies for Electric and Plug- in Hybrid Electric Vehicles", Springer, 1st edition, 2013.

Online Learning Resources:

1. **http://nptel.ac.in/syllabus/108103009**

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	PHOTOVOLTAIC SYSTEMS (OE-I)	L	T	P	C
25BPE25		3	0	0	3
	Semester	III			

COURSE OUTCOMES:

After the completion of the course students will be able to

CO1. Identify photovoltaic system components and system types.

CO2. Calculate electrical energy and power.

CO3. Correctly size system components, design considerations of solar equipment.

CO4. Design a basic grid-tie PV system.

UNIT-I:

SOLAR ENERGY

Sun and Earth, Solar Spectrum, Solar Geometry, Solar radiation on horizontal and inclined planes, Instruments for measurement of solar radiation, Solar cell, Equivalent circuit, V-I characteristics, Performance improvement.

UNIT-II:

SOLAR CELLS

Manufacture of Solar Cells-Technologies, Design of Solar cells, Photovoltaic modules, Design requirements, Encapsulation systems, Manufacture, Power rating, Hotspot effect, and Design qualifications.

UNIT-III:

PROTECTION AND MEASUREMENTS

Flat plate arrays, Support structures, Module interconnection and cabling, Lightning protection, Performance measurement using natural sun light and simulator, Determination of temperature coefficients, Internal series resistance, Curve correction factor.

UNIT-IV:

PHOTOVOLTAIC SYSTEMS

Photovoltaic systems, Types, General design considerations, System sizing, Battery sizing, Inverter sizing, Design examples, Balance of PV systems.

UNIT-V:

MAXIMUM POWER POINT TRACKERS

Maximum power point trackers, Perturb and observe, Incremental conductance method, Hill climbing method, , Hybrid and complex methods, Data based and other approximate methods, Instrument design, Other MPP techniques, Grid interactive PV system.

TEXTBOOKS:

1. F.C.Treble, "Generating electricity from Sun", Pergamon Press.

2. A.K.Mukherjee, Nivedita Thakur," Photovoltaic systems: Analysis and design", PHI, 2011.

REFERENCE BOOKS:

1. C.S.Solanki," Solar Photovoltaic's: Fundamentals, Technologies and applications", PHI, 2009.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	ADVANVANCED DATA STRUCTURES & ALGORITHMS (OE-I)	L	T	P	C
25BCS01		3	0	0	3
	Semester	III			

Course Objectives:

The course aims to:

1. Introduce fundamental data structures including linked lists, stacks, queues, trees, graphs, dictionaries, and hashing techniques.
2. Develop algorithmic skills for designing and analyzing searching, sorting, and traversal methods.
3. Teach implementation of priority queues, binary search trees, and balanced trees (AVL, Red-Black, Splay, B-Trees).
4. Enable students to select and apply appropriate data structures for solving computational problems efficiently.
5. Foster understanding of the performance analysis and comparative evaluation of data structures and algorithms.

Course Outcomes:

After completing this course, students will be able to:

CO1: Implement and manipulate linear data structures like singly/doubly linked lists, circular lists, stacks, and queues using dynamic memory allocation.

CO2: Apply and analyze searching and sorting algorithms including linear, binary search, bubble, selection, insertion, quick, and merge sort.

CO3: Design and implement dictionaries and hashing techniques to efficiently store and retrieve data.

CO4: Construct and operate on trees and priority queues, performing insertion, deletion, and traversal operations.

CO5: Compare and implement balanced search trees (AVL, Red-Black, Splay, B-Trees) for optimized data access and storage.

UNIT I: Introduction

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT II: Searching and Sorting:

Linear and Binary, Search Methods, Sorting: -Basic sorting techniques, Radix Sort, Bucket Sort, Shell Sort Trees- Binary trees, Properties, Representation and Traversals, Expression Trees (Infix, prefix, postfix). Graphs-Basic Concepts, Storage structures and Traversals.

UNIT III: Dictionaries and Hashing

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing

UNIT IV: Priority queues

Definition, ADT, Realizing a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT V: Search Trees-

AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching, Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

Text Books:

1. Data Structures: A Pseudo Code Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon and Cengage

2. Data Structures, Algorithms and Applications in java, 2/e, SartajSahni, University Press

Reference Books:

1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.

2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage

3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad and S Chand & Co.

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)

M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	CLOUD COMPUTING (OE-I)	L	T	P	C
25BCS04		3	0	0	3
	Semester	III			

Course Objectives:

- Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure. Compare the advantages and disadvantages of various cloud computing platforms.
- Investigate how a global storage solution can be optimized so that it can be delivered successfully from the cloud
- Evaluate information storage management design in a cloud environment and how it relates to the business objectives of an organization
- Analyze how best to provide reliable access to information both locally and remotely using storage technologies
- Critically appraise the opportunities and challenges of information management in complex business environments.

Course Outcomes:

After the completion of the course, student will be able to

- Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google App Engine.
- Program data intensive parallel applications in the cloud.
- Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
- Identify security and privacy issues in cloud computing.
- Solve a real-world problem using cloud computing through group collaboration.

UNIT–I:

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.

UNIT–II:

Virtualization concepts, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features

UNIT–III: Relational databases, Cloud file systems: GFS and HDFS, Bigtable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map -Reduce model, Parallel efficiency of Map Reduce.

UNIT–IV: Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security.

UNIT–V: Issues in cloud computing Implementing real time application over cloud platform, Issues in Inter - cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware.

TEXT BOOKS:

1. Enterprise Cloud Computing by Gautam Shroff, Cambridge publication
2. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.

REFERENCE BOOKS:

1. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley -India
2. Dr. Kumar Saurabh, "Cloud Computing", Wiley Publication
3. Dimitris N. Chorafas, "Cloud Computing Strategies" CRC Press; 1 edition [ISBN: 1439834539],2010 4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw Hill Osborne Media; 1 edition [ISBN: 0071626948], 200
5. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley Publication, 2011
6. Tim Mather, SubraKumaraswamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", O'ReillyMediaInc, 2009

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	DISSERTATION PHASE - I	L	T	P	C
25BPE26		0	0	20	10
	Semester	III			

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)

M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	INDUSTRY INTERNSHIP	L	T	P	C
25BPE27		0	0	0	2
	Semester	III			

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
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CHITTOOR – 517 127 (A.P)
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES

Course Code	CO-CURRICULAR ACTIVITIES	L	T	P	C
25BPE27		0	0	0	1
	Semester	III			

SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CHITTOOR – 517 127 (A.P)

M.TECH. IN POWER ELECTRONICS & ELECTRICAL TRONICS & ELECTRICAL DRIVES

Course Code	DISSERTATION PHASE - II	L	T	P	C
25BPE29		0	0	32	16
Semester		IV			