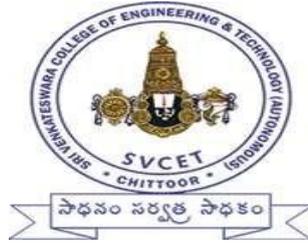


**COURSE REGULATIONS, STRUCTURE AND DETAILED SYLLABI  
FOR  
M.TECH UNDER ACADEMIC REGULATIONS R25  
FOR  
M.Tech Regular (Full Time) Two Year Post Graduate Degree Programme  
(For the Batches Admitted From 2025-2026)**

**POWER ELECTRONICS AND ELECTRICAL 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](http://www.svcetedu.org)**

**E-mail: [hodeee@svcetedu.org](mailto: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**

**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 Modelling and Analysis	3	0	0	3	40	60	100
Program Elective - I										
3	PE-I	25BPE03	Power Electronic Control of 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 Electronic Circuit Lab	2	0	0	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	0	0	4	2	40	60	100
AUDIT COURSE -I										
8	AC	25BHS02	English for Research paper writing	2	0	0	0	0	0	0
		25BST27	Disaster Management							
		25BHS03	Sanskrit for Technical Knowledge							
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>	<b>280</b>	<b>420</b>	<b>700</b>

**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	25BPE11	Modern Power Electronics	3	0	0	3	40	60	100
2	PC	25BPE12	FACTS Controllers	3	0	0	3	40	60	100
<b>Program Elective - III</b>										
3	PE-III	25BPE13	Advanced Electric Drives	3	0	0	3	40	60	100
		25BPE14	Advanced Power Semiconductor Devices & Protection							
		25BPE15	Applications of Power Converters							
<b>Program Elective -IV</b>										
4	PE-IV	25BPE16	Power Quality	3	0	0	3	40	60	100
		25BPE17	AI Techniques in Electrical Engineering							
		25BVL28	Digital Signal Processors and applications							
5	PC	25BPE18	Electric Drives Lab	2	0	0	2	40	60	100
6	PC	25BPE19	FACTS Devices & Simulation Lab	0	0	4	2	40	60	100
7	PR	25BPE20	Technical seminar	0	0	4	2	40	60	100
<b>AUDIT COURSE -II</b>										
8	AC	25BMB03	Pedagogy Studies	2	0	0	0	0	0	0
		25BHS04	Stress Management for Yoga							
		25BHS05	Personality Development through Life Enlightenment Skills							
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>	<b>280</b>	<b>420</b>	<b>700</b>

### 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
<b>Program Elective - V</b>										
3	PE-V	25BPE21	Control & Integration of Renewable Energy Sources	3	0	0	3	40	60	100
		25BPE22	Energy Storage Technologies							
		25BPE23	Hybrid Electric Vehicle Engineering							
<b>Open Elective</b>										
4	OE	25BCM28	Waste to Energy	3	0	0	3	40	60	100
		25BMB02	Cost Management of Engineering Projects							
		25BPE24	IoT Applications							
5	PR	25BPE25	Dissertation Phase – I	0	0	20	10	40	60	100
6	PC	25BPE26	Co-curricular Activities				2	40	60	100
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>18</b>	<b>280</b>	<b>420</b>	<b>700</b>

### 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	25BPE27	Dissertation Phase – II	0	0	0	16	120	180	300
<b>TOTAL</b>							<b>16</b>	<b>120</b>	<b>180</b>	<b>300</b>



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

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

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

**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 discontinuous 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, 3<sup>rd</sup> edition, 2009..
2. Mitchell D. M, DC-DC Switching Regulator Analysis, Mc Graw Hill, 1st edition, 1988.

#### **REFERENCE BOOKS:**

1. Ned Mohan, Power Electronics, John Wiley, 3<sup>rd</sup> 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, McGraw Hill, 3rd edition, 2010
4. Nave M.J, Power Line Filter Design for Switched-Mode Power Supplies, Mark Nave Consultants, 2nd edition, 2010..



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
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**CHITTOOR – 517 127 (A.P) INDIA  
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 modelling 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. Paul C. Krause, Oleg Wasyzcuk, Scott S, 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, “Electric Machinery”, Tata Mc Graw Hill, 7th Edition, 2020.
4. P. Kundur, “Power System Stability and Control”, MC Graw Hill Education, 1st edition, 2006..



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

Course Code	POWER ELECTRONIC CONTROL OF DC DRIVES (PE-I)	L	T	P	C
25BPE03		3	0	0	3
<b>Semester</b>		<b>I</b>			

**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. Analyse the current and speed controlled Drives.
- CO4. Design of chopper controlled DC motor Drives in various quadrants.

**UNIT – I Controlled Bridge Rectifier (1- $\Phi$ & 3- $\Phi$ ) 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 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



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

Course Code	MODERN CONTROL THEORY	L	T	P	C
25BPE04	(PE-I)	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,"LinearSystems", 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. B.N.Dutta, "Numerical Methods for linear Control Systems", Elsevier Publication, 2007.
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.



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

<b>Course Code</b>	<b>ENERGY AUDITING AND MANAGEMENT (PE-I)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE05</b>	<b>Common to (PE,PE&amp;ED, PS, EPS)</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>I</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO1. Understand the importance of energy conservation, present energy scenario and various energy conservation devices available.
- CO2. Analyze different methodologies used to reduce losses and various techniques used for energy auditing.
- CO3. Analyze and apply various instruments available to study different parameters such as heating etc.
- CO4. Apply the economic evaluation of energy conservation measures.

**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).  
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, IndustrialEnergyConservation-Pergamon Press, 1980.T.L.Boten,
3. LiptakB.G.,(Ed)InstrumentEngineersHandbook,ChintonBookCompany, 2004.
4. HodgeB.K,AnalysisandDesign ofEnergySystems,Prentice Hall, 2002.
5. Larry C.Witte, Schmidt & Brown, Industrial energy management and utilization. Hemisphere publishing, Co.NewYork, 1988.



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**CHITTOOR – 517 127 (A.P) INDIA**

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

<b>Course Code</b>	<b>SOLAR ENERGY CONVERSION SYSTEMS (PE-II)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE06</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>I</b>			

**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 PV- World energy scenario – Need for sustainable energy sources – Current status of Renewable energy sources – Place of photovoltaic in Energy supply – Solar radiation – The sun and earth movement – Angle of sunrays on solar collectors – Sun tracking – Estimating solar radiation empirically– Measurement of solar radiation.

**UNIT II Design of Solar Cells:**

Introduction to Solar cells- Solar cell design-Design for high ISC – Design for high VOC – Design for high FF-Upper limits of cell parameters – Short circuit current, open circuit voltage, fill factor, efficiency, losses in solar cells – Model of a solar cell- Effect of series and shunt resistance on efficiency- Effect of solar radiation on efficiency- Analytical techniques.

**UNIT III Solar Photo Voltaic Modules:**

Solar PV Modules from solar cells– Series and parallel connection of cells– Mismatch in module – Mismatch in series connection – Hot spots in the module- Bypass diode – Mismatching in parallel diode – Design and structure of PV modules – Number of solar cells in a module-Wattage of modules- Fabrication of PV module–PV module power output.

#### **UNIT IV Balance of Solar PV Systems:**

Basics of Electromechanical cell –Factors affecting performance – Batteries for PV systems –DC to DC converters – Charge controllers – DC to AC converters(Inverters) – Maximum Power Point tracking(MPPT)–Algorithms for MPPT.

#### **UNIT V PV System Design and Applications:**

Introduction to solar PV systems – Standalone PV system configuration – Design methodology of PV systems – 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.

#### **TEXTBOOKS:**

1. Chetan singhsolanki “Solar Photovoltaic Fundamentals: Technologies and Applications”, PHI publications, 3rd edition, 2015.

#### **REFERENCE BOOKS:**

1. H.P.Garg, J.Prakash “Solar Energy Fundamentals and applications “Tata McGraw-Hill publishers 1st edition”, 2000.
2. S.Rao& B.B.Parulekar,“EnergyTechnology”, Khanna publishers, 4th edition, 2005.



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(AUTONOMOUS)**

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

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

**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, Michael Meliss, Renewable Energy sources & Conversion Technology, Tata Mcgraw Hill Publishers & Co., 1st edition, 1990



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

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

Course Code	SMART GRID TECHNOLOGIES	L	T	P	C
25BPE08	(PE-II)	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](http://www.indiasmartgrid.org)



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

<b>Course Code</b>	<b>POWER ELECTRONICS CIRCUITS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE09</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
		<b>Semester</b>		<b>I</b>	

**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. Single Phase cycloconverter using MATLAB
8. Three Phase cycloconverter using MATLAB.
9. Single Phase Full Controlled Converter with R and R-L loads.
10. Designing of induction motor using Simulink

**REFERENCES:**

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



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

Course Code	RENEWABLE ENERGY SYSTEMS LAB	L	T	P	C
25BPE10		0	0	4	2
<b>Semester</b>		<b>I</b>			

**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. Power Electronic Circuits, Devices and Applications - M.H. Rashid - PHI, 2017
2. Ned Mohan, Power Electronics, John Wiley, 3rd edition, 2011

**WEB SOURCES:** <https://www.vlab.co.in>

**Note: Conduct any 7 experiments from 1-9 list and minimum 3 experiments from 1- 4 of Simulation experiments.**



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

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

**COURSE OUTCOMES:**

After the completion of the course students will be able to

CO1. Analyze research related information.

CO2. Follow research ethics.

CO3. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

CO4. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

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

**UNIT – I :**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations..

**UNIT II :**

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

**UNIT III:**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**UNIT IV:**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

**UNIT V:****TEXTBOOKS:**

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students.
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction.

**REFERENCE BOOKS:**

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Asimov, "Introduction to Design", Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.



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

<b>Course Code</b>	<b>ENGLISH FOR RESEARCH PAPER WRITING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BHS02</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>
		<b>Semester I</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

CO1. Understand the significance of writing skills and the level of readability.

CO2. Analyze and write title, abstract, different sections in research paper.

CO3. Develop the skills needed while writing a research paper.

**UNIT - I**

Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity

**UNIT - II**

Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cautionization

**UNIT - III**

Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion- Conclusions-Recommendations.

**UNIT - IV**

Key skills needed for writing a Title, Abstract, and Introduction

**UNIT - V**

Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions

**Suggested Reading:**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)  
Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press..
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.



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

<b>Course Code</b>	<b>DISASTER MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BST27</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>
		<b>Semester I</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO1. Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response.
- CO2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives.
- CO3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations Design of battery electric vehicles.
- CO4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.

**UNIT - I**

**Introduction:**

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade 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. R.Nishith, SinghAK, "DisasterManagementinIndia:Perspectives,issuesandstrategies.
2. "New Royal book Company..Sahni, Pardeep Et.Al.(Eds.), "Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
3. GoelS.L., "DisasterAdministrationAndManagementTextAndCaseStudies", Deep&Deep Publication Pvt. Ltd., New Delhi



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

<b>Course Code</b>	<b>SANSKRIT FOR TECHNICAL KNOWLEDGE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>21DAC101c</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>
		<b>Semester I</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

CO1. Understanding basic Sanskrit language..

CO2. Ancient Sanskrit literature about science & technology can be understood.

CO3. Being a logical language will help to develop logic in students.

**UNIT - I**

Alphabets in Sanskrit,

**UNIT - II**

Past/Present/Future Tense, Simple Sentences

**UNIT - III**

Order, Introduction of roots

**UNIT - IV**

Technical information about Sanskrit Literature

**UNIT - V**

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics.

**Suggested Reading:**

1. “Abhyaspustakam” –Dr.Vishwas, Sanskrit-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha- VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.



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

Course Code	MODERN POWER ELECTRONICS	L	T	P	C
25BPE11		3	0	0	3
<b>Semester</b>		<b>II</b>			

**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 bridge 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 Harmonic Injection PWM–Space Vector Modulation–Switching States– Space Vectors–Dwell Time Calculation– 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–Space Vector Modulation–Stationary Space Vectors–Dwell Time Calculation– 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. Ned Mohan, Tore M.Undel and William P.Robbind, “Power Electronics”, John Wiley & Sons, 3rd edition, 2007.

#### **REFERENCE BOOKS:**

1. Daniel W. Hart, “Power Electronics”, McGraw Hill Publications, 1st edition, 2010
2. V.R.Moorthi, “Power Electronics Devices, Circuits and Industrial applications”, Oxford University Press, 2005  
Dr.P.S.Bimbhra, “Power Electronics”, Khanna Publishers, 2006.
3. Philip T.Krein, “Elements of Power Electronics”, Oxford University Press, 2nd edition, 2014.
4. Bin Wu, “High-Power Converters and AC Drives”, IEEE Press A John Wiley & Sons, 2nd edition, 2017.



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

Course Code	FACTS CONTROLLERS	L	T	P	C
25BPE12		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 – Esquivel, Hugu Ambriz – Perez, Cesar Angeles – Camacho, WILEY, 1st edition, 2004.



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**CHITTOOR – 517 127 (A.P) INDIA**

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

<b>Course Code</b>	<b>ADVANCED ELECTRIC DRIVES (PE-III)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE13</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>II</b>			

**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) INDIA  
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES**

<b>Course Code</b>	<b>ADVANCED POWER SEMICONDUCTOR DEVICES AND PROTECTION (PE-III)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE14</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
		<b>Semester</b>		<b>II</b>	

**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. Mohan and Undeland, “Power Electronics Converters, Applications and Design”, John Wiley & Sons, 3rd edition, 2007.
3. B.W.Williams, “Power Electronics Circuit Devices, Drivers and Applications and passive components”, McGraw Hill higher education, 2nd edition, 1992..

#### **REFERENCE BOOKS:**

1. Vithayathil, “Power Electronics Circuits”, McGraw Hill Education, Indian edition, 2017.
2. W.C.Lander, “Power Electronics Circuits”, Tata McGraw Hill, 3rd Edition, 1995.
3. Loganathan Umanand, “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) INDIA**

<b>Course Code</b>	<b>APPLICATIONS OF POWER CONVERTERS (PE-III)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE15</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>II</b>			

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

**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) INDIA  
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES**

Course Code	<b>POWER QUALITY (PE- IV)</b>	L	T	P	C
<b>25BPE16</b>		<b>Semester</b>	<b>3</b>	<b>0</b>	<b>0</b>
		<b>II</b>			

**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.



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

<b>Course Code</b>	<b>AI TECHNIQUES IN ELECTRICAL ENGINEERING (PE-IV)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE17</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
		<b>Semester</b>		<b>II</b>	

**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 learns – 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-pointcrossover–Multipointcrossover–Uniformcrossover–Matrixcrossover-CrossoverRate-Inversion&Deletion–Mutationoperator– Mutation–MutationRate-Bit-wiseoperators-Generationalcycle- 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, "Neural Networks, Fuzzy Logic & Genetic Algorithms" 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, Van Nostrand Reinhold, "Neural Computing Theory & Practice", New York, 1st Edition, 1989.
2. Bart Kosko, "Neural Network & Fuzzy System", Prentice Hall, 1992.
3. G.J.Klir and T.A.Folger, "Fuzzy sets, Uncertainty and Information", Pearson, 1st edition, 2015.
4. D.E.Goldberg, "Genetic Algorithms", Pearson Education India, 1st edition, 2008.



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

<b>Course Code</b>	<b>DIGITAL SIGNAL PROCESSORS AND APPLICATIONS (PE-IV)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BVL28</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>II</b>			

**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 HamidA.Tolyat,“DSP based Electromechanical Motion Control”, CRCpress,1st edition, 2004.
2. WayneWolf, “FPGAbasedsystemdesign”,Prenticehall,1st edition, 2004

#### **REFERENCE BOOKS:**

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



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

Course Code	ELECTRIC DRIVES LAB	L	T	P	C
25BPE18		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 of 1-phase AC motor connected to AC voltage controller
3. Single-Phase dual converter connected separately excited DC motor drive
4. Speed control of 3-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. Pulsewidth modulation control of 1-phase AC motor connected to AC voltage controller
7. Torque-Speed characteristics of a 3-phase Permanent Magnet Synchronous Motor (PMSM) using PMSM- IM comprehensive drive system.
8. Torque-speed characteristics of a Separately Excited DC motor Drive fed by a two-pulse centre-tapped thyristor rectifier.
9. Torque-speed characteristics of a 6-pulse fully controlled rectifier fed Separately Excited DC motor Drive
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 of spectral performance of a 3-Ph VSI with V/Hz control of 3-Ph IM drives
13. Torque speed characteristics of a 3-Ph induction motor fed by a 3-Ph VSI

14. Implementation of centre spaced space vector modulation with DSP for V/Hz control of induction motor drives.

15. Implementation of discontinuous space vector modulation with DSP for V/Hz control of induction motor drives.

**Note: Any ten experiments out of the list provided.**



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

<b>Course Code</b>	<b>FACTS DEVICES &amp; SIMULATION LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE19</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>Semester</b>		<b>II</b>			

**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  $\delta$ , Q vs  $\delta$ , 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>



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

<b>Course Code</b>	<b>TECHNICAL SEMINAR</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE20</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
		<b>Semester</b>		<b>II</b>	

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

<b>Course Code</b>	<b>PEDAGOGY STUDIES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BMB03</b>	<b>(Audit Course)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Semester</b>		<b>II</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO4. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- CO5. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- CO6. 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 indepth 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)ClassroominteractioninKenyanprimaryschools,Compare, 31 (2): 245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,Journalof Curriculum Studies, 36 (3): 361-379.
4. AkyeampongK(2003) Teacher training in Ghana - does it count? Multi-site teachereducation 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 teacherpreparation 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)ReadIndia: A mass scale, rapid, ‘learning to read’campaign.
7. [www.pratham.org/images/resource%20working%20paper%202.pdf](http://www.pratham.org/images/resource%20working%20paper%202.pdf).

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

<b>Course Code</b>	<b>STESS MANAGEMENT FOR YOGA</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BHS04</b>	<b>(Audit Course )</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Semester</b>		<b>II</b>			

**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 aparigrahaaii) 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) INDIA  
M.TECH. IN POWER ELECTRONICS & ELECTRICAL DRIVES**

Course Code	PERSONALITY DEVELOPMENT THROUGH LIFE	L	T	P	C
21DAC201c	ENLIGHTENMENT SKILLS	2	0	0	0
<b>Semester</b>		<b>II</b>			

**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 Rolemodel. 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’s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.



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**CHITTOOR – 517 127 (A.P) INDIA**

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

<b>Course Code</b>	<b>CONTROL &amp; INTEGRATION OF RENEWABLE ENERGY SOURCES (PE-V)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE21</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>III</b>			

**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 of renewable energy penetration into the grid, Boundaries of the actual grid configuration, Consumption models and patterns, static and dynamic energy conversion technologies, interfacing requirements.

**UNIT II Dynamic Energy Conversion Technologies:**

Introduction to different conventional and nonconventional dynamic generation technologies, 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 Integration of different Energy Conversion Technologies:**

Control issues and challenges in 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”,IETPowerElectronicsSeries,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.



**SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY  
(AUTONOMOUS)**

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

<b>Course Code</b>	<b>ENERGY STORAGE TECHNOLOGIES (PE - V)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE22</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
		<b>Semester</b>		<b>III</b>	

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO1. Understand the role of electrical energy storage technologies in electricity usage, 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 :**

Characteristics of 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(H<sub>2</sub>), Synthetic natural gas (SNG), Electrical storage systems, Double-layer capacitors(DLC), Superconducting 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 (uninterruptible 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](http://www.ecofys.com/com/publications)



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

<b>Course Code</b>	<b>HYBRID ELECTRIC VEHICLE ENGINEERING (PE-V)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BPE23</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
		<b>Semester</b>		<b>III</b>	

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO1. Understand of hybrid electric vehicles and different energy storage techniques
- CO2. Analyze the advantages and disadvantages of hybrid electric vehicles over conventional vehicles and merits and demerits of hybrid electric trains over electrical trains
- CO3. Discuss the electric propulsion, 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 electric drive-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:**

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, 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”, CRC Press, 3rd edition, 2021..
2. Mehrdad Ehsani, 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. Ali Emadi, “Advanced Electric Drive Vehicles”, CRC Press, 1st edition, 2017.

### **REFERENCE BOOKS:**

1. James Larminie, John Lowry, “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>

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

<b>Course Code</b>	<b>WASTE TO ENERGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>25BBCM28</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Semester</b>		<b>III</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

CO1. To know about overview of Energy to waste and classification of waste.

CO2. To acquire knowledge on bio mass pyrolysis, gasification, combustion and conversion process in detail.

CO3. To gain knowledge on properties of biogas, biomass resources and programmes to convert waste to energy in India.

**UNIT - I**

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

**UNIT - II**

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

**UNIT - III**

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation

**UNIT - IV**

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

**UNIT - V**

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification- pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of

biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

**TEXTBOOKS:**

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 2018
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., TMH, 2017

**REFERENCE BOOKS:**

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996

**.Online Learning Resources:**

1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-ch13/>
2. <https://www.youtube.com/watch?v=x2KmjbcvKTK>



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

Course Code	COST MANAGEMENT OF ENGINEERING PROJECTS	L	T	P	C
23BMB02		3	0	0	3
<b>Semester</b>		<b>III</b>			

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- CO1. Know the cost management process and types of costs.
- CO2. Learn and apply different costing methods under different project contracts.
- CO3. To understand relationship of Cost-Volume and Profit and pricing decisions..
- CO4. Prepare budgets and measurement of divisional performance.
- CO5. Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost.

**UNIT - I**

Introduction and Overview of the Strategic Cost Management Process - Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

**UNIT - II**

Cost Behavior and Profit Planning: Marginal Costing- Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems; Pareto Analysis Just-in-time approach, Theory of constraints.; Divisional performance management: - Measurement of Divisional profitability - pricing decisions - transfer pricing.

**UNIT - III**

Target costing- Life Cycle Costing - Activity-Based Cost management:- Activity based costing- Value-Chain Analysis- Bench Marking; Balanced Score Card.

**UNIT - IV**

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

**UNIT - V**

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-

technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

**TEXTBOOKS:**

1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
2. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher

**REFERENCE BOOKS:**

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd

**Online Learning Resources:**

1. <https://nptel.ac.in/courses/105/104/105104161/>
2. <https://nptel.ac.in/courses/112/102/112102106/>



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

Course Code	INTERNET OF THINGS& ITS APPLICATIONS	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. Choose the sensors and actuators for an IoT application.
- CO2. Select protocols for a specific IoT application.
- CO3. Utilize the cloud platform and APIs for IoT applications.
- CO4. Experiment with embedded boards for creating IoT prototypes.
- CO5. Design a solution for a given IoT application.
- CO6. Establish a startup

**UNIT - I**

**Overview of IoT:**

The Internet of Things: An Overview, The Flavor of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

**Design Principles for Connected Devices:** Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

**Prototyping:** Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, **Open source Vs Close source, Tapping into the community.**

**UNIT - II**

**Embedded Devices:**

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

**UNIT - III**

**Communication in the IoT:**

**Internet Communications:** An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols Prototyping Online Components:

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

#### **UNIT - IV**

**Business Models:** A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups. Manufacturing: What are you producing, Designing kits, Designing printed circuit boards.

#### **UNIT - V**

Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.

Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions

#### **TEXTBOOKS:**

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

#### **REFERENCE BOOKS:**

1. HaiderRaad Fundamentals of IoT and Wearable Technology Design, Wiley Publications 2020.
2. KashishAraShakil, Samiya Khan, Internet of Things (IoT) Concepts and Applications, Springer Publications 2020.



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

Course Code	DISSERTATION PHASE - I	L	T	P	C
25BPE25		0	0	20	10
<b>Semester</b>		<b>III</b>			



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

Course Code	CO CURRICULAR ACTIVITIES	L	T	P	C
25BPE26		0	0	0	2
<b>Semester</b>		<b>III</b>			

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

Course Code	DISSERTATION PHASE - II	L	T	P	C
25BPE27		0	0	0	10
<b>Semester</b>		<b>IV</b>			