Shri Shankaracharya Technical Campus

Shri Shankaracharya Group of Institutions

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

DEPARTMENT OF ELECTRICAL ENGINEERING

M.Tech. in Power Systems Engineering

SECOND SEMESTER

S. No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of exam			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory/Practical				
							ESE	CT	TA		
1.	Electrical Engg.	EE226201	EHV-AC & DC	3	1	-	100	20	20	140	4
2.	Electrical Engg.	EE226202	Power Quality Assessment and Mitigation	3	1	-	100	20	20	140	4
3.	Electrical Engg.	EE226203	Power System Stability and Control	3	1	-	100	20	20	140	4
4.	Electrical Engg.	EE226204	Power Generation Operation & Control	3	1	-	100	20	20	140	4
5.	Refer Table-I		Elective-I	3	1	-	100	20	20	140	4
6.	Electrical Engg.	EE226291	Power System Analysis Lab	-	-	3	75	-	75	150	2
7.	Electrical Engg.	EE226292	Power Quality Lab	-	-	3	75	-	75	150	2
TOTAL				**15**	**5**	**6**	**650**	**100**	**250**	**1000**	**24**

Table -I

Elective- I			
Sr. No.	**Board of Study**	**Subject Code**	**Subject**
1	Electrical Engg.	EE226221	Transients in Power System
2	Electrical Engg.	EE226222	Restructuring Power System
3	Electrical Engg.	EE226223	Distribution System Automation

Lecture T- Tutorial P- Practical ESE- End Semester Exam
CT- Class Test TA- Teachers Assessment

Note(1)– 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a Particular academic session.

Note(2)– Choice of elective course once made for an examination cannot be changed in future examinations.

M. Tech (Power System Engineering)

Subject Code	EE226201	L = 3	T = 1	P = 0	Credits = 4
Subject	EHVAC&DC	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1. To prepare the students to understand the state of art of HVDC technology. 2. To enable students to model and analyze HVDC systems. 3. To make students to understand and study concepts and operation of FACTS controllers and compensators and gain knowledge of travelling waves. 4. To understand various FACTS controllers. 5. To understand various problems associated with transmission system.	Students will be able to:- **CO1** Understand fundamentals of EHVAC and DC transmission system with converter circuits, their faults and protection. **CO2** Model and analyze HVDC system for inter area power flow regulation. **CO3** Analyze the converter and DC grid faults and adopt methods to mitigate them. **CO4** Analyze the HVDC converter reactive power requirements and address the issues. **CO5** Able to understand the travelling of voltage and currents waves in transmission line.

UNIT I: Fundamentals of EHVAC & DC Transmission **CO1,2**

Comparison of EHVAC and DC transmission with Advantages & Disadvantages, Principal & Application of AC and DC Transmission, Trends in EHVDC Transmission, Power-handling capacity, Kind of DC Links. Basic Components of EHVDC System. **[10Hrs]**

Converter Circuits

Detailed Analysis of HVDC Converter, Pulse Number, Choice of Converter Configuration, Converter Bridge Characteristics, Simplied Analysis of Greatz Circuit, Characteristics of A Twelve Pulse Converter.

UNIT II: Converter Faults & Protection **CO3**

Converter Faults, Protection Against Overcurrents, Overvoltages in Converter Station, Surge Arresters, Harmonics Mis-Operation, Commutation Failure, Smoothing Reactors, DC Line, Reactive Power Requirements, Harmonics Generation, Adverse Effects, Classification, Remedial Measures to Suppress, Filters, Ground Return. **[10Hrs]**

UNIT III: Control of EHVDC System **CO2**

Control of EHVDC System Desired Features of Control, Converter Control Characteristics, Constants Current Control, Constant Extinction Angle Control, Ignition Angle Control, Parallel Operation of HVAC & DC System, Telecommunication Requirements, Problems and Advantages. **[10Hrs]**

UNIT IV: VSC-Based FACTS Controllers: **CO4**

Introduction to FACTS Controllers,

Shunt Compensation

Shunt Reactive Current Injection, Shunt-Connected Compensating Voltage Source Behind an Impedance, Shunt-Connected Compensating Voltage Behind a Coupling Transformer, Static Synchronous Compensator (STATCOM) , Control of STATCOM.

[10Hrs]

Series Compensation

Static Synchronous Series Compensator (SSSC), Control of SSSC,
Stable Reversal of Power Flow, Reactance Control Method, Voltage Control Method ,
Shunt–Series Compensation Using a Unified Power Flow Controller (UPFC), Control of UPFC.

UNIT V: Traveling Waves and Over Voltages in Transmission System **CO5**

Traveling Waves on Transmission Systems, Their Shape, Attenuation And Distortion, Effect of Junction and Termination on Propagation of Traveling Waves, Over Voltages in Transmission System, Lightning, Switching and Temporary Over Voltage: Control of Lighting and Switching Over Voltages.

[10Hrs]

Text Books:

S. No.	Title	Authors	Publisher
1)	EHV AC Transmission	Begamudre	New Age International
2)	EHV AC & DC Transmission	Manoj Nair	Balaji publication
3)	HVDC Transmission	K.R. Padiyar	New Age Pbs.
4)	Introduction to FACTS Controllers: Theory Modeling & Applications	Kalyan K Sen & Mey Ling Sen	Wiley Interscience

Reference Books:

S. No.	Title	Authors	Publisher
1)	EHV-AC and HVDC Transmission Engineering and Practice:	Sunil S. Rao	Khanna Publisher
2)	Direct current transmission	Edward Wilson Kimbark	Wiley Interscience
3)	HVDC & FACTS Controllers: Applications of Static Converters in Power System.	Vijay K Sood	Kluwer Academic Publishers,New York
4)	HVDC Transmission	S.Kamakshaih & V Kamaraju	Tata Mc Hill

M. Tech (Power System Engineering)

Subject Code	EE226202	L = 3	T = 1	P = 0	Credits = 4
Subject	Power Quality Assessment and Mitigation	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

Course Objectives	Course Outcomes
This course will cover the 1. Various power quality issues encountered by the power systems. 2. Harmonics, its types and impacts on various machines and loads. 3. Power factor improvement methods and applications. 4. Harmonic filtering. 5. Various grounding and wiring techniques with its types and requirements	On successful completion of the course ,the student will be able to: **CO1** Power quality and its types. **CO2** Harmonics associated with power system and its impacts. **CO3** Different techniques for improving the power factor. **CO4** Methods of filtering out the harmonics in power. **CO5** Different wiring and grounding methods and its benefits..

UNIT I: Introduction- power quality: **CO1**

voltage quality, overview of power quality phenomena, classification of power quality issues, power quality measures and standards, THD-TIF-DINC- message weights-flicker factor-transient phenomena, occurrence of power quality problems, power acceptability curves, IEEE guides, standards and recommended practices. **[8Hrs]**

UNIT II: Harmonics: **CO2**

Individual and total harmonic distortion, RMS value of a harmonic waveform, triplex harmonics, important harmonic introducing devices, SMPS, Three phase power converters, arcing devices, saturable devices, harmonic distortion of fluorescent lamps, effect of power system harmonics on power system equipment and loads. Transmission and distribution systems, shunt capacitors, transformers, electric machines, ground system loads that cause power quality problems, power quality problems created by drives and its impact on drives. **[10Hrs]**

UNIT III: Power factor improvement: **CO3**

Passive Compensation, Passive Filtering, Harmonic Resonance,
Impedance Scan Analysis, Active Power Factor Corrected Single Phase Front End, Control Methods for Single Phase APFC, Three Phase APFC and Control Techniques, PFC Based on Bilateral Single Phase and Three Phase Converter. Static VAR compensators, SVC and STATCOM.. **[10Hrs]**

UNIT IV: Active Harmonic Filtering: **CO4**

Active Harmonic Filtering, Shunt Injection Filter for single phase, three-phase three-wire and three-phase four-wire systems, d-q domain control of three phase shunt active filters uninterruptible power supplies-constant voltage transformers, series active power filtering techniques for harmonic cancellation and isolation . Dynamic Voltage Restorers for sag, swell and flicker problems. **[10Hrs]**

UNIT V: Grounding and wiring: **CO5**

Introduction, NEC grounding requirements, reasons for grounding, typical grounding and wiring problems, solutions to grounding, and wiring problems. **[10Hrs]**

Text Books:

S. No.	Title	Authors	Publisher
1)	Electric power quality	G.T.Heydt	Stars in circle
2)	Understanding Power Quality Problems	Math H. Bollen	IEEE Press series on power and energy systems

Reference Books:

S. No.	Title	Authors	Publisher
1)	Power System Quality Assessment	J. Arrillaga	John wiley
2)	Power system Harmonic .Analysis	J. Arrillaga, B.C. Smith, N.R. Watson & A. R.Wood	Wiley

M. Tech (Power System Engineering)

Subject Code	EE226203	L = 3	T = 1	P = 0	Credits = 4
Subject	Power System Stability and Control	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1. To identify power system control problems 2. To understand the frequency control and AGC in single area and Interconnected Systems Operation 3. To analyze different methods to control reactive power 4. To analyze various types of stability properties of power systems 5.To understand the function of SCADA & EMS	Students will be able to:- **CO1** Analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand. **CO2** Understand the significance of power system stability and control. **CO3** Acquire knowledge on real power-frequency interaction. **CO4** Understand the reactive power-voltage interaction. **CO5** Design SCADA and its application for real time operation.

UNIT I: Power System Control **CO1**

Operating states & control strategies, Design & operating criteria for stability

Power system components: Hydraulic and steam turbine, Effect of exciter and governor. Excitation system – requirements, functions, types and modeling of excitation systems, IEEE standards and models. **[8Hrs]**

UNIT II: Active power & frequency control: **CO3**

Power, Frequency characteristics, Division of load, Load frequency control- Generator, load and Prime mover models, Governor models, AGC in a single area system, AGC in a multi area system, Tie- line bias control, Implementation of AGC, Under frequency load shedding. **[10Hrs]**

UNIT III: Reactive Power & voltage control: **CO4**

Relation between voltage, power and reactive power, Generation and absorption of reactive power, voltage control and voltage stability analysis, V-Q curvesand sensitivity analysis, Voltage stability indices, Factors affecting voltage instability and voltage collapse. **[10Hrs]**

UNIT IV: Stability Studies: **CO2**

Power System Stability –classification, terms and definitions, Small- signal and transient stability analysis of single machine and multi-machine systems, Transient Stability: Solution of swing equations, swing curves, stability criterion, Mid- term and long term stability **[10Hrs]**

UNIT V: Computer Control of Power Systems: **CO5**

Need of computer control of power systems- concept of energy control centers and functions PMU – system monitoring, data acquisition and controls – System hardware configurations SCADA and EMS functions – state estimation problem – measurements and errors - weighted least square estimation – various operating states – state transition diagram. **[10Hrs]**

Text Books:

S. No.	Title	Authors	Publisher
1	Power System Stability and Control	Prabha Kundur	Mc-Graw Hill Inc
2	Power System Voltage Stability	Taylor C.W.	Mc-Graw Hill Inc
3	Power System Analysis	Hadi Saadat	McGraw Hill Education

Reference Books:

S. No.	Title	Authors	Publisher
1	Power System Dynamic, Stability and Control	K.R.Padiyar	Inter Publishing
2	Power System Operation and Control	P.S.R. Murthy	Tata Mc-Graw
3	Power System Engineering.	Nagrath IJ, Kothari	Tata Mc-Graw
4	Electric Power System	Weedy B.M.	John Wiley and Sons

M. Tech (Power System Engineering)

Subject Code	EE226204	L = 3	T = 1	P = 0	Credits = 4
Subject	Power Generation Operation and Control	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
This course will cover the 1. To study the characteristic of generation unit and economic dispatch problem and method to solve it. 2. To study the power flow problem with solutions. 3. To understand the concepts of unit commitment. 4. To study the different methods of Hydrothermal Scheduling. 5. To understand the concept of control of Generation.	On successful completion of the course ,the student will be able to: **CO1** Student will be able to analysis the characteristic of unit and understand the economic dispatch problem and its method. **CO2** Student will be able to solve the power flow problem. **CO3** Student will be able to understand the concepts of unit commitment. **CO4** Student will be able to analysis the different methods of Hydrothermal Scheduling. **CO5** Student will be able to understand the concept of control of Generation.

UNIT I: CHARACTERISTICS OF GENERATING UNITS: CO1

Characteristics of Steam Units, Variations in Steam Unit Characteristics, Cogeneration Plants, Light Water Moderated Nuclear Reactor Units, Hydroelectric Units, The economics Dispatch Problem, Thermal System Dispatching with Network Losses Considered, The Lambda Iteration Method, Gradient Methods of Economics Dispatch**.**

[10Hrs]

UNIT II: POWER FLOW PROBLEM AND ITS SOLUTIONS: CO2

Power Flow Problem and its solutions on a Direct Current Network**,** Formulation of the AC Power Flow by Gauss-Seidel Method and Newton-Raphson Method**,** Decoupled Power Flow and the "DC" Power Flow. **[10Hrs]**

UNIT III: UNIT COMMITMENT: **CO3**

Introduction, Constraints in Unit Commitment, Spinning Reserve, Thermal Unit Constraints, Other Constraints, Hydro Constraints, Must Run, Fuel Constraints, Unit Commitment Solution Methods, Priority List Methods, Dynamic- Programming Solution, Forward DP Approach, and Lagrange Relaxation Solution.

[10Hrs]

UNIT IV: HYDRO THERMAL COORDINATION: **CO4**

Introduction, Long-Range Hydro-Scheduling, Short Range Hydro-Scheduling, Hydroelectric Plant Models, Scheduling Problems, Types of Scheduling Problems Scheduling Energy, The Short Term Hydro Scheduling: A Gradient Approach, Hydro Units in series (Hydraulically Coupled), Dynamic Programming solution to the Hydrothermal Scheduling Problem, Hydro Scheduling Using Linear Programming**.**

[10Hrs]

UNIT V: CONTROL OF GENERATION: **CO5**

Introduction, Generator Model, Load Model, Prime Mover Model, Governor Model, Tie-Line Model, Generation Control, Supplementary control Action, Tie Line Control, Generation Allocation, Automatic Generation Control (AGC) implementation, AGC Features**.** **[10Hrs]**

Text Book:

S. No.	Title	Authors	Edition	Publisher
(1)	Power Generation Operation and Control	L.N.J. Wood & B.F. Woolenberge	Second Edition 1996	John Wiley and Sons
(2)	Power System Operation and Control	S. Sivanagaraju & G. Sreenivasan	2009	Pearson Education, India,

Reference Book:

S. No.	Title	Authors	Edition	Publisher
(1)	Computer Modeling of Electrical Power Systems	J. Arrilaga, C.P. Arnold, B.J. Harker	1983	John Wiley and Sons
(2)	Power system operation control & Restructuring	S.K. Gupta	-	Dreamtech, Wiley

M. Tech (Power System Engineering)

Subject Code	EE226221	L = 3	T = 1	P = 0	Credits = 4
Subject	Transients in Power System	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
This course will cover the 1. To study the transients and its behavior in the network. 2. To study the behavior of circuit breakers during various faulty conditions. 3. To understand the concepts of lightening, traveling waves and various other parameter in a line. 4. To study various simulation methods for transients calculations in a line. 5. To understand the concept of various system insulators for line protection.	On successful completion of the course ,the student will be able to: **CO1** Student will be able to understand the transients, its nature and behavior. **CO2** Student will be able to understand the concept of current chopping, control of transients and methods. **CO3** Student will be able to understand the concepts of traveling waves, lightening phenomena in a line. **CO4** Student will be able to do various transient analysis. **CO5** Student will be able to understand the concept of over voltage limiting devices.

Unit I: Origin and nature of transients and surges.

Equivalent circuit representations. Lumped and distributed circuit transients. Line energisation and de-energisation transients. Earth and earth wire effects.

Unit II: **Current Chopping in circuit breakers.**

Short line fault condition and its relation to circuit breaker duty. Trapped charge effects. Effect of source and source representation in short line fault studies. Control of transients.

Unit III: **Lightning phenomena.**

Influence of tower footing resistance and earth resistance. Traveling waves in distributed parameter multi-conductor lines, parameters as a function of frequency.

Unit IV: Simulation of surge diverters in transient analysis:

Influence of pole opening and pole closing. Fourier integral and Z transform methods in power system transients. Bergeron methods of analysis and use of EMTP and EMTDC/PSCAD package.

Unit V: Insulation Coordination:

over voltage limiting devices, dielectric properties, breakdown of gaseous insulation, tracking and erosion of insulation, high current arcs.

Text Book

S. No.	Title	Authors	Publisher
(1)	Transients in Power System	V. A. Vanikov	Mir Publications, Moscow.
(2)	Electrical Transients in Power Systems	Greenwood:A	John Wiley & Sons,

Reference Book:

S. No.	Title	Authors	Publisher
(1)	Power System Transients	C. S. Indulkar and D.P. Kothari	John Wiley and Sons
(2)	Traveling Waves on Transmission Lines	Bewley; L.V.,	Dover Publications Inc., New York.

M. Tech (Power System Engineering)

Subject Code	EE226222	L = 3	T = 1	P = 0	Credits = 4
Subject	Restructuring Power System	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
This course will cover the 1. To study basic concepts and definition related to power system. 2. To study the restructuring procedure of power system. 3. To understand the concepts of power Sector deregulation 4. To study the different methods pricing applied to electricity 5. To understand the concept of Congestion management.	On successful completion of the course ,the student will be able to: **CO1**.Student will be able to understand the basic concept and definitions of power system. **CO2**. Student will be able to understand the restructuring procedure of power system. **CO3**. Student will be able to understand the concepts of deregulation of Power Sector . **CO4**. Student will be able to analysis the different pricing applied to electricity. **CO5**. Student will be able to understand the concept of Congestion management..

Unit- 1: Introduction:

Basic concept and definitions, privatization, restructuring, transmission open access, wheeling, deregulation, components of deregulated system, advantages of competitive system.

Unit- 2: Power System Restructuring:

An overview of the restructured power system, Difference between integrated power system and restructured power system. Explanation with suitable practical examples.

Unit- 3:Deregulation of Power Sector:

Separation of ownership and operation, Deregulated models, pool model, pool and bilateral trades model, Multilateral trade model. Competitive electricity market: Independent System Operator activities in pool market, Wholesale electricity market characteristics, central auction, single auction power pool, double auction power pool, market clearing and pricing, Market Power and its Mitigation Techniques, Bilateral trading, Ancillary services.

Unit- 4: Transmission Pricing:

Marginal pricing of Electricity, nodal pricing, zonal pricing, embedded cost, Postage stamp method, Contract Path method, Boundary flow method, MW-mile method, MVA-mile method, Comparison of different methods.

Unit- 5: Congestion Management:

Congestion management in normal operation, explanation with suitable example, total transfer capability (TTC), Available transfer capability (ATC), Different Experiences in deregulation: England and Wales, Norway, China, California, New Zealand and Indian power system.

Text Book

S. No.	Title	Authors	Publisher
(1)	Power System Restructuring and Deregulation	Loi Lei Lai	John Wiley & Sons Ltd
(2)	"Restructured Power Systems"	S. A. Khaparde	A. R. Abhyankar, Narosa Publishing House, New Delhi

Reference Book:

S. No.	Title	Authors	Publisher
(1)	Operation of Restructured Power Systems	Kankar Bhattacharya, Math H.J. Bollen, Jaap, E. Daalder	Springer Ltd
(2)	Restructured Electrical Power Systems: Operation, Trading, and Volatility	Shahidehpour, Muwaffaq Alomoush	CRS Press.
(3)	Restructured Power Systems (Engineering and Economics)"	**David**, A. Kumar, **Wen**, F.S	Springer Ltd.

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SCHEME OF EXAMINATION AND SYLLABUS

M. Tech (Power System Engineering)

Subject Code	EE226223	L = 3	T = 1	P = 0	Credits = 4
Subject	Distribution System & Automation	CT	TA	Total	ESE Duration
Evaluation Scheme	100	20	20	140	3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1. To learn the importance and planning of economic distribution of electrical energy with remote metering and energy management strategies. 2. To study the coordination of protective and automation devices with SCADA system & substation automation systems. 3. To impart the knowledge of capacitive compensation voltage control. 4. To understand various losses in distribution system and the methods to overcome the same. 5. To understand energy monitoring and management.	Students will be able to:- **CO1** Analyze a distribution system and will able to work on distribution automation systems. **CO2** Design protective systems and coordinate the devices by understanding basics of SCADA system and substation automation system. **CO3** Able to design equipments for distribution system and substations. **CO4** Able to understand the energy management concepts with metering methods and feeder automation.

UNIT I: Distribution System Planning And Automation: **CO1,3**

Power Sector Reforms, Basic Distribution Systems, Short-Term Load Forecasting, Long-Term Energy Forecasting, Technological Forecasting, Problems of existing Distribution System, Need for Distribution Automation, Characteristics of Distribution System, Distribution Automation (Objectives, Functions, Benefits), Feeder Automation, Communication Requirements for DA, Remote Terminal Unit (RTU), Communication Technologies for DA. **[10Hrs]**

UNIT II: SCADA System: **CO2**

Introduction, Block Diagram, Components of SCADA, Functions of SCADA, and SCADA applied to Distribution Automation, Advantages of DA through SCADA, Requirements and Feasibility, DA Integration Mechanisms, Communication Protocols in SCADA Systems. **[10Hrs]**

UNIT III: Substation Automation: **CO1,3**

Introduction, Definition of Substation Automation, Functions of Substation Automation System, State and Trends of Substation Automation, Intelligent Affordable Substation Monitoring and Control, Advantages of an EEM (Enterprise Energy Management) Substation Automation Solution. **[10Hrs]**

UNIT IV: Feeder Automation :

Losses in Distribution Systems, System Losses and Loss Reduction, Network Reconfiguration, Improvement in Voltage Profile, Capacitor Placement in Distribution System for Reactive Power Compensation, Algorithm for location of capacitor. **CO1,3**

[10Hrs]

UNIT V: Remote Metering And Energy Management: **CO4**

Background for Automatic Meter Reading (AMR) for Utility, Components of AMR Systems, Communications Methods used for Meter Reading, AMR System, Services and Functions, Financial Analysis, Planning for AMR Implementation. Energy Management, Need Based Energy Management (NBEM), Demand Side Management (DSM). **[10Hrs]**

Text Books:

S. No.	Title	Authors	Publisher
1)	Tutorial Course: Distribution Automation	D. Bassett, K. Clinard, J. Grainger, S. Purucker, and D. Ward	IEEE Tutorial Publication 88EH0280-8-PWR, 1988.
2)	Control and Automation of Electrical Power Distribution Systems	James Northcote-Green, Robert Wilson	CRC Press, Taylor and Francis Group, 2007
3)	Electric Power Distribution, Automation, Protection and Control.	James A Momoh	CRC press.
4)	Electric Power Distribution	A. S. Pabla	Tata Mc Graw Hill.

Reference Books:

S. No.	Title	Authors	Publisher
1)	Distribution System Analysis & Automation	Juan.M.Gers	The institution of Engineering & Technology, UK,2014
2)	Electric Power Distribution Engg	Turan Gonen	Graw Hill,1986.

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M. Tech (Power System Engineering)

Subject Code	EE226291	L = 0	T = 0	P = 3	Credits = 2
Subject	Power System Analysis Lab	CT	TA	Total	ESE Duration
Evaluation Scheme	75	-	75	150	-

List Of Experiments:

1. Reactive Power Control By Excitation System (Simulation Study)

2 Simulation and study of a Power System Stabilizer.

3 Load frequency control of a two area system.(Simulation study)

4 Microprocessor based load frequency control.(Simulation study)

5 Study of a HVDC Transmission system and its simulation.

6 Study of a characteristic of a 12-plus convertor.

7 Analysis of PV & QV curves for voltage stability.

8 Transient stability analysis of a multi-machine system.

9 Automatic Generation Control in a Restructured Power system.

10 Characteristic of long transmission Line and compensation.

M. Tech (Power System Engineering)

Subject Code	EE226292	L = 0	T = 0	P = 3	Credits = 2
Subject	Power Quality Lab	CT	TA	Total	ESE Duration
Evaluation Scheme	75	-	75	150	-

List of Experiments:

1. Simulation of Power quality disturbance using MATLAB/ SIMULATION.
2. To measure the performance like THD. PF of a three phase fully controlled converter feeding a resistive load.
3. To measure the performance like DF & CF of a single phase fully controlled converter feeding a RL load.
4. To measure and analyze the harmonic contents of a three phase inverter fed non line load
5. To study and simulate power filter.
6. To study and simulate active power filter.
7. Application of FFT/wavelet techniques for power quality analysis using MATLAB/ SIMULATION.
8. Simulation of Dynamic voltage restore (DV Ohms) for sweg. Swell and Flicker problems.
9. Simulation of D-stacom for Powerfactor character using MATLAB / SIMULATION.
10. To measure and analyze the source voltage and input current wave form for three phase induction motor fed through indirect vector control drive unit.