Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Name of the Programme: M Tech in Power Systems	**Year**: II	**Semester**: III
Course Name: Power Sector Economics, regulation & Restructuring	**Course Code**: EEPL311	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Fundamentals of restructured power sector models:** Fundamentals of Power Sector Economics; Pricing and Regulation of Natural Monopoly; Techno-economic & regulatory issues involved in deregulation of power industry. Privatization, Competition in the electricity sector, conditions, barriers, different types of industry structures and ownership/ management forms for generation, transmission and distribution. Components of restructured systems, key market entities- ISO, TSO, GENCO, TRANSCO, DISCO, RETAILCO, Functions and responsibilities, Trading arrangements: Pool, bilateral & multilateral, Open Access Transmission Systems & Distribution Systems. **Power Sector Reform and Regulation in Practice:** Electricity Act 2003: Policies and rules; Introduction to the Power Sector Reforms; Economic Principles and Evolution; Renewable Energy Policy, Legal Aspects, Regulation and Market; Economic rationale for regulation, Developments in Policy Framework for the Indian Power System illustrating the regulatory and policy changes in the Indian power sector; Emerging Regulatory Challenges.	10
3	**Power Sector Technological & Operational aspects:** Economic Fundamentals of Power Sector; Market Failure and Natural Monopoly; Pricing and Regulation of Natural Monopoly; Theories of Regulation; Economics of Regulation; Regulatory Framework and its evolution; Tariff Framework and Regulatory Perspective; Legal and Commercial Aspects of Tariff; Tariff Tariff Determination for Generators; Evolution of Transmission Pricing and POC Charge; MYT Framework for ARR and Tariff Determination for DISCOMs; ARR and Tariff Determination for DISCOMs - A Case Study; Cost of Service Regulation, Performance Based Regulation and Beyond; Legal and Commercial Aspects of Tariff; Electricity Consumer Grievance Redressal: Institutional Approach and Practices; Performance-based Tariff Regulations for the distribution network - Experience in US; A Look into Future Regulation and Performance of DCPRs; Evolution of DNO Regulation, Future of Networks and Consumer Behaviour	10
4	**Implementation of Deregulated Smart Grid Technologies:** Implications of design, modeling, and management of distributed energy resources & renewable energy resources; Impact on smart grid: reliability, sustainability, flexibility, and resiliency; Smart Business models for coordination among different electricity market players; Principles and Practice of Power Procurement in the Power	8

	Sector; Regulatory Framework for Long-term Demand Forecasting and Power Procurement Planning.	
5	Competition and Power Market Development: Overview of the status of the development of the Power Market in India, case discussions on related concepts; Existing Regulatory framework in Electricity Retail Tariff and Designing Retail Electricity Tariff: Emerging Issues and International Perspectives: International experience from power sector deregulation/reform; Global power sector, regulatory policies and reforms.	8
6	Power System Operation and Ancillary Services: Role and importance of ancillary services in power systems, their classification, procurement methods, and evolving trends. Role of grid operators, service delivery instructions, monitoring, reporting, and penalties for non-delivery. Cost drivers for ancillary services, regulation, and reserve products. Frequency-based services- Inertia, Primary Frequency control, (High- and low-frequency) Power smoothing. Non-frequency Ancillary Services: Voltage regulation (including unbalance mitigation), Congestion management. Emerging services- harmonic mitigation and fault contribution, Integration of renewable energy, cybersecurity, digital twins, market mechanisms for reactive power and efficiency with a focus on BRIC countries (Brazil, Russia, India, and China), impact of the ancillary services market on DSM charges, market-based ancillary services procurement.	8
	Total	**45**

Text Books:

1. Power System Restructuring and Deregulation Edited by Loi Lei Lai Copyright © 2001 John Wiley & Sons Ltd ISBNs: 0-471-49500-X (Hardback); 0-470-84611-9 (Electronic)
2. G Migliavacca, TSO-DSO Interactions and Ancillary Services in Electricity Transmission and Distribution Networks, Modeling, Analysis and Case-Studies, Springer Nature Switzerland AG, 2020.
3. Khan, B., Mahela, O., Padmanaban, S., & Alhelou, H. H. (Eds.). (2022). Deregulated Electricity Structures and Smart Grids. CRC Press.
4. Mohammad Shahidehpour and MuwaffaqAlomoush, "Restructured Electrical Power Systems: Operation, Trading, and Volatility, Marcel Dekker, Inc., CRC Press, 2001.
5. Devika Jay, K. Shanti Swarup, Market Operation for Reactive Power Ancillary Service Design and Analysis with GAMS Code, Springer, 2024.
6. Shahidehpour, M., Yamin, H., & Li, Z. (2002). Market operations in electric power systems: forecasting, scheduling, and risk management. John Wiley & Sons.

References:

1. Refaat, S. S., Ellabban, O., Bayhan, S., Abu-Rub, H., Blaabjerg, F., & Begovic, M. M. (2021). Smart Grid and Enabling Technologies. John Wiley & Sons.
2. Pandey, I. M. (1995). Finance: A management guide. PHI Learning Pvt. Ltd.
3. Tanaka, M., Conejo, A. J., & Siddiqui, A. S. (2022). Economics of power systems. Springer.
4. Xu Andy Sun, Antonio J. Conejo, Robust Optimization in Electric Energy Systems, 2022
5. Antonio Gómez-Expósito, Antonio J. Conejo, Claudio A. Cañizares (Editors), Electric Energy Systems: Analysis and Operation, 2nd Edition, 2018.

6. Antonio J. Conejo, Luis Baringo, Power System Operations, 2018.
7. Antonio J. Conejo, Luis Baringo Morales, S. Jalal Kazempour, Afzal S. Siddiqui, Investment in Electricity Generation and Transmission, 2016.
8. Juan M. Morales, Antonio J. Conejo, Henrik Madsen, Pierre Pinson, Marco Zugno, Integrating Renewables in Electricity Markets, 2014.
9. Steven A. Gabriel, Antonio J. Conejo, J. David Fuller, Benjamin F. Hobbs, Carlos Ruiz, Complementarity Modeling in Energy Markets, 2013.
10. Antonio J. Conejo, Miguel Carrión, Juan M. Morales, Decision Making Under Uncertainty in Electricity Markets, 2010.
11. Antonio Gómez-Expósito, Antonio J. Conejo, Claudio Cañizares (Editors), Electric Energy Systems: Analysis and Operation, 2008.
12. https://cer.iitk.ac.in/ Power Sector Regulation: Theory and Practice
13. Prasanth Regy, Rakesh Sarwal, Clay Stranger, Garrett Fitzgerald, Jagabanta Ningthoujam, Arjun Gupta, Nuvodita Singh. 2021. Turning Around the Power Distribution Sector: Learnings and Best Practices from Reforms. NITI Aayog, RMI, and RMI India.
14. Sioshansi, F. (Ed.). (2023). The Future of Decentralized Electricity Distribution Networks. Elsevier.
15. Konstantinos Oureilidis, Charis S. Demoulias, Kyriaki-Nefeli Malamaki, Georgios C. Kryonidis, Eleftherios O. Kontis, Spyros I. Gkavanoudis, Ancillary Service in Active Distribution Systems from Renewable Energy Sources: Control Methodologies and Trends, Elsevier, 2025.

Prerequisite:

1. Restructured Power System
2. Economic Operation of Power System
3. Power System Planning
4. Electricity Tariff framework

Name of the Programme: M.Tech. in Power Systems	**Year**: II	**Semester**: III
Course Name: FACTS and Custom Power Devices	**Course Code**: EEPL312	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme: 3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	**Theory of Power Transmission Control:** Flow of power in an AC system, Constraints of maximum transmission line loading, power flow and dynamic consideration of transmission interconnection, Basic types of FACTs controller, Need of FACTs controller, Analysis of uncompensated AC transmission lines. Transmission line compensation- Passive Reactive Power Compensation. Shunt and series compensation at the mid-point of an AC line. Comparison of Series and Shunt Compensation	10
3	**Static Shunt Compensator:** Static versus passive VAR compensator, Static shunt compensators: SVC and STATCOM, Operation and control of TSC, TCR and STATCOM - Compensator control, Comparison between SVC and STATCOM, System stability enhancement.	8
4	**Static Series Compensator:** Concept of series compensation, voltage stability, variable impedance type series compensators, GCSC, TSSC, TCSC and SSSC operating principle and characteristics and their application, Stability enhancement by Static Series Compensator.	8
5	**Static voltage and phase angle regulators:** TCVR and TCPAR Operation and Control, Applications, Improvement of transient stability and mitigation of Sub-Synchronous Resonance.	8
6	**UPFC and IPFC:** Introduction to Unified Power Flow Controller, Circuit Arrangement, Operation and control of UPFC, Basic Principle of P and Q control, UPFC model for power flow studies, Independent real and reactive power flow control- Applications. Introduction to interline power flow controller, Basic operating principle, characteristics and application.	10
	Total	**45**

TEXT BOOKS:

1. K.R. Padiyar, “FACTS controllers in power transmission and distribution” New Age international (P) Ltd., Publishers, 2007, ISBN (13) : 978-81-224-2541-3
2. Narain G. Hingorani, Laszlo Gyugyi, “Understanding FACTS: Concepts and technology of Flexible AC Transmission System,” IEEE Power Engineering Society, IEEE Press, ISBN: 0-7803-3455-8

REFERENCE BOOKS:

1. Timothy J.E. Miller, “Reactive Power control in electric systems,” John Wiley & Sons, 1982, ISBN 0-471-86933-3
2. R. Mohan Mathur, Rajiv K. Verma, “Thyristor based FACTS controllers for Electrical
3. Transmission Systems,” IEEE Press, Wiley Interscience, 2002, ISBN 0-471-20643-1
4. R.C. Dugan, “Electric Power Systems,” McGraw Hill, 2012
5. Bhim Singh, “Power Quality Problems and Mitigation Techniques,” Wiley, 2015, ISBN:9781118922057

6. K.S.Sureshkumar ,S.Ashok , "FACTS Controllers & Applications", E-book edition, Nalanda DigitalLibrary, NIT Calicut,2003.
7. G T Heydt , "Power Quality", McGraw-Hill Professional, 2007 6. T J E Miller, "Static Reactive Power Compensation", John Wiley and Sons, Newyork, 1982
8. X P Zhang, C Rehtanz, B Pal, "Flexible AC Transmission Systems- Modelling and Control", SpringerVerlag, Berlin, 2006

Prerequisite:

1. Passive and Active elements in power system. Passive components used for the compensation of reactive power.
2. Reactive power, power factor, compensation of reactive power.
3. Load Compensation
4. Harmonics and their Fourier analysis
5. Basic theory of electrical machines
6. Power electronic devices used in power system, types, characteristics, their use as a switch

Name of the Programme: M.Tech. in Power Systems	**Year**: II	**Semester**: III
Course Name: Energy Management & Audit	**Course Code**: EEPL313	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Energy Management:** Objective of Energy Management, General principles of energy management and its planning. ECBC code (basic aspects), Building Management System (BMS). **Energy Audit:** Energy Audit Definition as per EC act-2001, Objective, Need of Energy Audit, Types and methodologies, Roll of Bureau of Energy Efficiency (BEE), Energy Auditors and managers. Case-studies/ Report studies of Energy Audits. Guidelines for writing energy audit report, data presentation in report, findings recommendations, impact of renewable energy on energy audit recommendations. Instruments for Audit and Monitoring Energy and Energy Savings, Types and Accuracy.	10
3	**Energy Management in Electricity Utilization:** Electricity transmission and distribution system. Opportunities in Lighting: Modern energy efficient light sources, life and efficacy comparison with older light sources, energy conservation in lighting, use of sensors and lighting automation. Opportunities in Motors: Development of energy efficient motors and the present status, techniques for improving energy efficiency, necessity for load matching and selection of motors for constant and variable loads. Opportunities in Transformers: Present maximum efficiency standards for power and distribution transformers, design measures for increasing efficiency in electrical system components.	10
4	**Demand side Management (DSM):** Introduction, benefits of DSM, different techniques of DSM– time of day pricing, multi-utility power exchange model, time of day models for planning. DSM and Environment. Load management, load priority technique, peak clipping, peak shifting, valley filling, strategic conservation, energy efficient equipment. Power factor improvement.	8
5	**Energy Economics:** Economic analysis methods, cash flow model, time value of money, evaluation of proposals, pay-back period, average rate of return method, internal rate of return method, present value method, life cycle costing approach. Computer-aided Energy Management Systems (EMS).	8
6	**Energy Efficiency Performance Analysis:** Different Case Study of Energy audit and management of commercial and industrial sites/projects (Boilers, Steam System, Furnaces, Refrigeration and Air conditioning, Waste Heat recovery etc.).	8
	Total	**45**

Textbooks:

1. S.S. Thipse, Energy Conservation and Management, Narosa Publishing House, 2014.
2. Steve Doty and Wayne C. Turner, Energy management Handbook, The Fairmount Press, Inc., 2012.
3. Charles M. Gottschalk, Industrial energy conservation, John Wiley & Sons Inc., 1996.
4. Albert Thumann, William J. Younger, Handbook of Energy Audits, River Publishers, 2012.

Reference Books:

1. Energy Conservation Act- 2001 and Related Rules and Standards, Ministry of Power, India.
2. Energy efficiency in electrical utilities, Guidebook, Bureau of Energy Efficiency (BEE), India.
3. General Aspects of Energy Management & Energy Audit, Guidebook, BEE, India.
4. Energy efficiency in thermal utilities, Guidebook, BEE, India.
5. Energy performance assessment for equipment and utility systems, Guidebook, BEE, India.
6. Susmita Mishra, Engineering Economics & Costing, PHI Publication.
7. D. Yogi Goswami and Frank Kreith, Energy Management and Conservation Handbook, CRC Press, 2016.
8. Amlan Chakrabarti, Energy Engineering and management, PHI Publication, 2019.

Prerequisite:

1. Basic Electrical Engineering
2. Generation of Electrical Power
3. Electrical Machine
4. Power system

Name of the Programme: M.Tech. in Power Systems	**Year**: II	**Semester**: III
Course Name: Research Methodology & IPR	**Course Code**: NP40.02	**Credit**: : 03
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 03 hours	**Teaching Scheme:** 3L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Research Methodology**: Basic Statistics, Inferential statistics, Central tendency of data, Standard deviation, frequency distribution, level of measurement, Probability distribution, Normal distribution, Correlation, Numerical problems, Introduction to research, Need of research, 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	10
3	**Research Approaches:** Approaches of investigation of solutions for research problems, Sample design, data collection, Regression and Z-test, t-test, ANOVA, analysis, interpretation, Necessary instrumentations, Effective literature studies approaches, analysis. Plagiarism, Research ethics, examples	8
4	**Effective Technical Writing**: Development of Research Proposal, citation of references, Report writing, Precautions for writing research reports	8
5	**Nature of Intellectual Property**: Patents, Designs, Trademarks, and Copyright, Geographical Indications. Process of Patenting and Development, International Scenario, International Cooperation on Intellectual Property	8
6	**Patent Rights:** Scope of Patent Rights, Licensing and transfer of technology, patent Infringement and Enforcement. New developments in IPR: IPR of Biological Systems, Computer Software, etc. Case Studies on Intellectual Properties	10
	Total	**45**

Text Books:

1. Research Methodology by C. R. Kothari, New Age Publication, 2nd Revised Edition
2. Research Methodology-Concept and Cases 2020 - Deepak Chawla, 2nd Edition, Vikas Publications
3. Intellectual Property A Primer for Academia by Dr. RupinderTewari and Ms. Mamta Bhardwaj, Honorary Director Publication Bureau, Panjab University Chandigarh

Reference Books:

1. Research Methodology and Quantitative Methods- Rao G Nageswara, B S Publications
2. Intellectual Property rights - 2020 by GanguliPrabuddha, McGraw Hill Education

Prerequisite:

1. Knowledge of Basic Statistics

Name of the Programme: M.Tech. in Power Systems	**Year**: II	**Semester**: III
Course Name: Fundamental of Power Systems	**Course Code**: EEPL340.01	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme: 3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Basic Concepts**: Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids. Transmission and Distribution Systems: Line diagrams, transmission and distribution voltage levels and topologies (meshed and radial systems). Review of Three-phase systems. Analysis of simple three-phase circuits. Power Transfer in AC circuits and Reactive Power.	10
3	**Over-voltages and Insulation Requirements:** Generation of Over-voltages: Lightning and Switching Surges. Protection against Overvoltages, Insulation Coordination. Propagation of Surges. Voltages produced by traveling surges.	6
4	**Conventional Energy Generation:** **Thermal Power plants:** selection of site, elements of the plant, Plant layout. **Gas Power Plants:** elements of the plant, Plant layout, open cycle, and closed cycle gas turbine plants, combined gas & steam plants-basic schemes. **Hydro Power Plants:** Selection of site, elements of the plant, Classification of hydroelectric plants. Layout of hydroelectric and pumped storage plants. **Nuclear Power Plants:** selection of site, nuclear reaction – fission and fusion process and chain reaction, plant layout, nuclear reactor – working, and control (boiling water reactor, heavy water reactor, and fast breeder reactor)	10
5	**Power Factor Improvement** Causes and effects of low power factor and advantages of power factor improvement. Power factor improvement using shunt capacitors and synchronous condensers.	8
6	**Tariff** Objectives of tariffs. General tariff form. Flat demand rate, straight meter rate, block meter rate. Two part tariff, power factor dependent tariffs, three part tariff. Spot (time differentiated) pricing.	10
	Total	**45**

Text Books:

1. B.R. Gupta, "Generation of Electrical Energy", S. Chand Limited, 2009
2. G.D. Rai, Non Conventional Energy Sources, Khanna Publication
3. Leonard L. Grigsby –Electric Power Generation, Transmission, and Distribution, CRC Press
4. S.N. Singh, "Electrical Power Generation, Transmission & Distribution", PHI Pvt. Ltd

Reference Books:

1. Wadhwa, C.L., "Generation Distribution and Utilization of Electrical Energy", New Age International publishers, 3rd edition, 2010.
2. Deshpande M.V, "Elements of Electrical Power Systems Design", Pitman, New Delhi, PHI Learning Private Limited, 1st edition, 2009.

Prerequisite:

1. Basic Electrical Engineering

Name of the Programme: M.Tech. in Power Systems	**Year**: II	**Semester**: III
Course Name: Renewable Energy Technology	**Course Code**: EEPL340.02	**Credit**: 3
Max Marks: 100	**CIE:** 40	**SEE:** 60
End Term Exam Time: 3 Hrs	**Teaching Scheme:** 3L+0T+0P	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Types of Renewable Energy** –Solar, Wind, Fuel Cell, Biomass, Hydro-Electric, Geothermal; Powering DG systems Operation requirements for Distributed Energy Resources (DERs) integration into power systems (Voltage and frequency function, Power system restoration, Confirming reliability, Virtual inertia)	8
3	**Hybrid Renewable Energy System:** Chronological Evolution of Energy Industry, Criteria for Sustainable Source of Energy, Hybrid Energy System, Hybrid Renewable Energy System (HRES), Hybrid Energy Storage, Hybrid Grid Transport, Hybrid Smart Grid, Role of HRES in Grid-connected Buildings and Vehicles, Management and Control Issues of HRES in the Grid	8
4	**Grid Energy Storage Technologies :** Pumped Hydro, Compressed Air, Flywheel, Superconducting Magnet Storage System, Battery Energy Storage System (BESS), Capacitors and Super Capacitors, Fuel Cell, Thermal Storage System. BESS- Battery Chemistry Types (PbA, Ni-Cd, Ni-MH, Li-ion, NaS, RFB); Components of BESS, Grid Connection, Ownership Models (Third-Party, Outright Purchase/Full Ownership, Electric Cooperative Approach to Energy Storage Procurement); Cost–Benefit Analysis; Battery Recycling and Reuse; Policy Recommendations-Frequency Regulation, Peak Shaving, Load Leveling, Distribution & Transmission Grids, Microgrids. Hybrid Energy Storage System(HESS)- hybridization architectures, control and optimization, Applications (EV, Microgrid, Off grid applications)	12
5	**EVs integration with RESs** Integration of electric vehicles with renewables into power grids, EVs integration with RESs, EVs for ancillary services, V2G concept and challenges; Hybrid Vehicles (HV), Types of Hybrid Renewable Solar Vehicles, Battery Electric Vehicles, Power Electronics of Hybrid Vehicles, Types of Electrical Machines for HV, Economics and Market for Hybrid Cars	8
6	**Green energy solutions for climate action:** Role of innovation and intellectual property rights for clean energy technologies; Green energy solutions for rural households and communities, for agriculture on-farm, for agriculture post-harvest; Smart energy in urban households, Green solutions for public spaces and infrastructure, energy efficiency for water utilities, Energy-efficient supermarkets, Energy smart data centers. Natural Gas to Drive Green and Sustainable Developments in India, Scope for Small Hydro Projects in India, Hydrogen and Fuel Cells, Energy Sustainability Through Nuclear Energy	8
	Total	**45**

Text Books:

1. Kathiresh, M., Subahani, A. M., & Kanagachidambaresan, G. R. (Eds.). (2021). Integration of renewable energy sources with smart grid. John Wiley & Sons.
2. Shah, Y. T. (2021). Hybrid power: generation, storage, and grids. CRC Press.
3. Sharma, A., & Kar, S. K. (Eds.). (2015). Energy sustainability through green energy. Springer.
4. Abdelhay A. Sallam and Om P. Malik, "Power Grids with Renewable Energy Storage, integration and digitalization," IET ENERGY ENGINEERING SERIES 67, Pub. By The Institution of Engineering and Technology, 2021. ISBN 978-1-83953-027-2.
5. "Renewable Energy - Resources, Challenges and Applications," Edited by Mansour Al Qubeissi, Ahmad El-kharouf and Hakan Serhad Soyhan. IntechOpen, Lonmdon, United Kingdom, 2020. Print ISBN 978-1-78984-283-8. http://dx.doi.org/10.5772/intechopen.81765
6. World Intellectual Property Organization (WIPO) (2024). Green Technology Book: Energy Solutions for Climate Change. Geneva: WIPO. DOI 10.34667/tind.50132, ISBN: 978-92-805-3688-1 (print)
7. Asian Development Bank, Hanbook on Battery Energy Storage system, 2018, DOI: http://dx.doi.org/10.22617/TCS189791-2, ISBN 978-92-9261-470-6 (print),

Reference Books:

1. Bansal, R. (2017). Handbook of distributed generation. Electric Power Technologies, Economics and Environmental Impacts, 11, 6330.
2. Ardakanian, O., Keshav, S., & Rosenberg, C. (2019). Integration of Renewable Generation and Elastic Loads into Distribution Grids.
3. IRENA, COP28, COP29, GRA, MoEA and Government of Brazil (2024), Delivering on the UAE Consensus: Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030, International Renewable Energy Agency, COP28 Presidency, COP29 Presidency, Ministry of Energy of the Republic of Azerbaijan, and Government of Brazil, Abu Dhabi.
4. Bollen, M. H., & Hassan, F. (2011). Integration of distributed generation in the power system. John wiley & sons.
5. Singh, S. N. (2015). Non Conventional Energy Resources. Pearson Education India.

Prerequisite:

1. Renewable Energy Systems
2. Generation of Electrical Power/ Power Generation Sources
3. Economic Operation of Power System
4. Power System Planning

Teaching and Examination Scheme

II Year IV Semester: M.Tech. (PS)

S. No.	Course Code	Course Name	Category	Teaching Scheme			Exam Hrs	Marks			Credit
				L	T	P		CIE	SEE	Total	
1	EEPD470	Dissertation	REW	-	-	-	-	360	240	600	20
										Total Credit	**20**