PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MTPS12101	Flexible AC Transmission Systems (FACTS)	3	1	-			Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Basic Knowledge of Power Electronics.
Course Outcome	1. Understand the importance of controllable parameters and benefits of FACTS controllers.
	2. Analyze the functional operation and control of GCSC, TSSC and TCSC.
	3. Know the significance of shunt, series compensation and role of FACTS devices on system control.

Unit	Contents (Theory)	Marks Weightage
I	**Facts Concepts** - 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.	**14**
II	**Voltage Source Converters** - 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.	**14**
III	**Static Shunt Compensation** - Objectives of shunt compensation, mid-point voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators switching converter type VAR generators hybrid VAR generators.	**14**
IV	**SVC and STATCOM** - The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.	**14**
V	**Static Series Compensators** - Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, and functional requirements of GTO controlled series capacitor (GCSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), Control schemes for GSC TSSC and TCSC.	**14**

Text Book/References Books/ Websites

1. N.G. Hingorani and L. Guygi "Understanding FACTS Devices". IEEE Press Publications.
2. Wayne Goddard and Stuart Melville; Research Methodology: An Introduction.
3. Narain G. Hingorani & Laszlo Gyugyi; Understanding Facts: Concepts and Technology of Flexible AC Transmission Systems Paperback – 18 Mar 2011

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MTPS12102	Advanced Power System Stability	3	1	-			Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Knowledge about Power system elements.
Course Outcome	1. Acquire knowledge about stability of Power System.
	2. Learn modeling of Power System components.
	3. Understanding stability and their importance.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Power System Stability Problem**: - Definition of stability, classification of stability, Rotor angle stability, frequency stability, voltage stability, mid-term and long term stability, classical representation of synchronous machine in a single machine infinite bus system (SMIB), equal area criterion to asses stability of system, limitations of classical model of synchronous machines.	**14**
II	**Modeling of Power System Components for Stability Analysis:** - Synchronous machine modeling: sub-transient model, two axis model, one axis (flux decay) model, classical model. Excitation systems modeling: DC excitation, AC excitation and static excitation. Prime mover and energy supply systems modeling. Transmission line modeling, load modeling. Methods of representing synchronous machines in stability analysis.	**14**
III	**Small Signal Stability:-**Fundamental concepts, state space representation, Modal analysis: Eigen properties, participation factors, stability assessment. Effects of excitation system on stability, power system stabilizer and its design, Angle and voltage stability of multi-machine power systems and phenomenon of sub synchronous resonance.	**14**
IV	**Transient Stability:-**Fundamentals of transient stability, numerical solutions: simultaneous implicit and partitioned explicit methods, simulation of dynamic response, analysis of unbalanced faults, direct method of transient stability, transient energy function method, Methods of improving transient stability.	**14**
V	**Voltage Stability:-**Classification of voltage stability, modeling requirements, voltage stability analysis: static and dynamic, sensitivity analysis, modal analysis, voltage collapse, prevention of voltage collapse.	**14**

Text Book/References Books/ Websites

1. P.Kundur; "Power system stability and control"; TataMcGraw Hill.
2. K. R.Padiyar; "Power system dynamics"; BSP publications.
3. M.A.Pai and Peter W.Sauer; "Power system stability"; Pearson Education.
4. Paul M.Anderson and A.A. Fouad; "Power system stability"; Wiley-interscience.

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
MTPS12103	Modern Control Theory	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Knowledge of Laplace, Fourier, Differential equation and other basic mathematics terms.
Course Outcome	1. Knowledge of performances of system.
	2. Formulate mathematical model for physical systems.
	3. Analyze performance characteristics of system using frequency response methods.

Unit	Contents (Theory)	Marks Weightage
I	**Overview of Control Systems**: LTI Motion Control System; Temperature & Voltage Regulators; Modeling of Servo-motors, Hydraulic & pneumatic actuators. Computation of Relative stability using Bode plot and Nyquist method. Hierachical Control Of Power System; System Control; Load scheduler and Optimiser; Real Reactive power Flow Control; AVR and Turbine Speed governor set points.	**14**
II	**Control System Performance:** Improvement of System Performance through Compensation; Design of lag; Lead and Lag load Compensators; PI, PD & PID control; PID Controller Design and tuning; Disturbance rejection; System Uncertainty and performance Robustness.	**14**
III	**Analysis in state space:** State model for SISO & MIMO Systems; State Diagram; Solution of state equation; State Transformations; Jacobian Linearization Technique; Stability; Controllability & Observability; Perspective on State-Space design; Full-State Feedback Design of continuous time control system; Full Order observer System.	**14**
IV	**Digital Control system:** Configuration of Digital Control System; Supervisory Control; Direct digital control; Single-Loop Digital controllers; Sampling Process; Sampling theorem; Data reconstruction; Digital transfer function & System response; Stability Tests ; Mapping between s-plane & z-plane; Bilinear transformation; Error constants; Pole assignment design based on full state feedback; Compensator design in w-plane using Bode plot.	**14**
V	**Non-linear System:** Common non-linearities ; Methods of Analysis; Linearization; Phase Plane method; Describing function Analysis; Limit Cycles; Relay with dead-zone and hysteresis; Stability analysis by Lyapunov's methods.	**14**

Text Book/References Books/ Websites

1. I.J.Nagrath and M. Gopal; "Control Systems Engineering"; New Age International Publishers,
2. Benjamin.C. Kuo; "Digital Control Systems"; Oxford University Press, Second edition.
3. Roy Choudhary; "Modern Control Engineering"; PHI.
4. K.K. Agrawal; "Control System Analysis and Design"; Khanna Publishers.
5. M.N. Bandhopadhyay; "Control Engineering Theory and Practice"; PHI.
6. Ogata; "Modern Control Engineering"; P.H learning.
7. Kuo B.C; "Automatic Control Systems",Prentice hall.

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MTPS1202	Power Quality	3	1	-			Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Knowledge about the disturbances of Power.
Course Outcome	1. Analyze voltage sag problems and suggest preventive techniques.
	2. Identify the harmonic sources and the effects of harmonic distortion.
	3. Identify the DG sources; analyze the power quality issues and operating conflicts when DG is interconnected to the grid.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction**:-Introduction of the Power Quality (PQ) problem, Terms used in PQ: Voltage, Sag, Swell, Surges, Harmonics, over voltages, spikes, Voltage fluctuations, Transients, Interruption, overview of power quality phenomenon, Remedies to improve power quality, power quality monitoring.	**14**
II	**Long & Short interruptions:**-Interruptions – Definition – Difference between failures, outage, Interruptions – causes of Long Interruptions – Origin of Interruptions – Limits for the Interruption frequency – Limits for the interruption duration – costs of Interruption – Overview of Reliability evaluation to power quality, comparison of observations and reliability evaluation. **Short Interruptions:** definition, origin of short interruptions, basic principle, fuse saving, voltage magnitude events due to re-closing, voltage during the interruption, monitoring of short interruptions, difference between medium and low voltage systems. Multiple events, single phase tripping – voltage and current during fault period, voltage and current at post fault period, stochastic prediction of short interruptions.	**14**
III	**1 & 3-Phase Voltage Sag Characterization:** Voltage sag – definition, causes of voltage sag, voltage sag magnitude, and monitoring, theoretical calculation of voltage sag magnitude, voltage sag calculation in non-radial systems, meshed systems, and voltage sag duration. Three phase faults, phase angle jumps, magnitude and phase angle jumps for three phase unbalanced sags, load influence on voltage sags.	**14**
IV	**Power Quality Considerations In Industrial Power Systems**:Voltage sag – equipment behavior of Power electronic loads, induction motors, synchronous motors, computers, consumer electronics, adjustable speed AC drives and its operation. Mitigation of AC Drives, adjustable speed DC drives and its operation, mitigation methods of DC drives.	**14**
V	**Mitigation of Interruptions & Voltage Sags:** Overview of mitigation methods – from fault to trip, reducing the number of faults, reducing the fault clearing time changing the power system, installing mitigation equipment, improving equipment immunity, different events and mitigation methods. System equipment interface – voltage source converter, series voltage controller, shunt controller, combined shunt and series controller. **Power Quality and EMC Standards:**Introduction to standardization, IEC Electromagnetic compatibility standards, European voltage characteristics standards, PQ surveys.	**14**

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Text Book/References Books/ Websites

1. Roger C. Dugan , Mark F. Mc Granaghan, Surya Santoso, H. Wayne Beaty ; "Electrical Power Systems Quality"; Tata McGraw Hill Education Private Ltd.
2. Math H J Bollen;"Understanding Power Quality Problems"; IEEE Press.
3. C. Sankaran; "Power Quality"; CRC Press.

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
MTPS1203	Energy Auditing Conservation and Management	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Knowledge of the Energy related issues and their related terms.
Course Outcome	1. Conservation of energy and its management, energy planning, and energy economics.
	2. Know-How of energy efficient machinery systems, energy losses and their management.
	3. Know-How of Energy forecasting, Energy economics, Energy pricing and incentives for energy conservation.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction**: Energy Scenario – global, sub continental and Indian, Energy economy relation, Future energy demand and supply scenario, Integrated energy planning with particular reference to Industrial Sector in India, Captive power units and others – demand v/s supply. **Types of Energy:** Physical Aspects of Energy: Classification of energy – Hydel, Thermal, Nuclear, Wind, & from Waste Products. Efficiency and effectiveness of energy utilization in Industry. Energy and energy analysis. Renewable and nonrenewable energy, Conventional and unconventional energy.	**14**
II	**Energy Management:** Principles of energy management, organizing energy management program, Energy Planning, Energy Staffing, Energy Organization, Energy Requirement. Energy Costing, Energy Budgeting, Energy Monitoring, Energy Consciousness, Energy Conversions, Energy Efficient Equipment, Energy Management Professionals, Environment Pollution due to Energy Use, Components of Pollution, Harmful Effects of Pollution, Measures taken to combat Pollution.	**14**
III	**Energy Efficient Motors:** Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed, variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit.	**14**
IV	**Energy Audit and Energy Saving:** Energy Audit and analysis, Energy load measurements, System evaluation and simulation, Energy saving techniques and guidelines: Administrative control, Proper Measurement and monitoring system, Process control, proper planning & scheduling, Increasing capacity utilization, Improving equipment control, waste heat recovery, Change of energy source. Upgradation of Technology. Change of product specifications, Use of High efficiency equipment, Design modification for better efficiency, Improved periodic maintenance.	**14**
V	**Economic Aspects and Analysis:** Economics Analysis-Depreciation Methods, time value of money, rate of return , present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.	**14**

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Text Book/References Books/ Websites

1. W.R. Murphy and G. Mckay Butter worth; "Energy management"; Heinemann publications.
2. Paul o' Callaghan; "Energy management" Mc-graw Hill Book company-1st edition.
3. John .C. Andreas; "Energy efficient electric motors"; Marcel Dekker Inc Ltd-2nd edition.
4. Barny L. Capehart, Wainey C. Turner, William J. Kennedy; "Guide to Energy Management"; Fairmont Press Inc., GA 30047.

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
MTPS1204	Advanced Power System Protection Relays	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance Max. Marks:-15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:-Nil

Pre-Requisite	Knowledge about the protective circuits and its elements.
Course Outcome	1. Proficiency in voltage & frequency control of modern power system.
	2. Competence in power System Protection analysis.
	3. Acquire to understand the types of Contingencies in power systems.

Unit	Contents (Theory)	Marks Weightage
I	**General philosophy of protection**-Characteristic function of protective relays-basic relay elements and relay terminology-basic construction of static relays-non-critical switching circuits.	**14**
II	**Protective relays** – protection of generators – Transformer protection – magnetizing inrush current – Application and connection of transformer differential relays – transformer over current protection	**14**
III	**Bus protection** - Techniques applicable for line protection –long EHV line protection Backup remote local and Breaker failure.	**14**
IV	**Placement of Reactors in Power Systems**- Transformer tap changing –Protection of boosters-capacitors in an interconnected power system.	**14**
V	**Digital signal processing** –digital filtering in protection relays- numeric protection –testing Digital filtering in protection relays – digital data transmission– relay hardware – relay algorithms. Concepts of modern coordinated control system.	**14**

Text Book/References Books/ Websites

1. Lewis Blackburn, J.; "Protective Relaying – Principles and Applications", MarceL Dekkar, INC, New York, 2006.
2. The Electricity Training Association, „Power System Protection Vol1-4", The IEE, U.K.
3. Stanley, H.Horowitz (ED); Protective relaying for power systems II", IEEE Press.

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
MTPS1205	Advanced HVDC Transmission Systems	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance Max. Marks:-15
Practical Internal Max Marks: Nil.	Lab work & Sessional – Max Marks:-Nil.	Assignment / Quiz/Attendance - Max. Marks:-Nil.

Pre-Requisite	Knowledge about the High voltage lines and concepts of Power Transmission.
Course Outcome	1. Know-how of operation of Power in HVDC system.
	2. Competency in designing filters & DC link control for HVDC System.
	3. Acquaintance with MTDC system & it's open challenges.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:-**General consideration, Power Handling Capabilities of HVDC Lines Basic Conversion principles, static converter configuration	**14**
II	**Static Power Converters:-**3-pulse, 6-pulse, and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters	**14**
III	**Control of HVDC Converters and Systems:-**Constant current, constant extinction angle and constant ignition angle control Individual phase control and equidistant firing angle control DC power flow control. Interaction between HV AC and DC systems – Voltage interaction Harmonic instability problems and DC power modulation	**14**
IV	**MTDC Systems & Over Voltages:-**Series parallel and series parallel systems their operation and control. Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults	**14**
V	**Converter Faults & Protection:-**Converter faults, over current protection – valve group, and DC line protection over voltage protection of converters, surge arresters.	**14**

Text Book/References Books/ Websites

1. Kimbark E.W.; Direct current Transmission; Wiley Inter Science – New York.
2. Arillaga J.; "HVDC Transmission"; Peter Peregrinus ltd. London UK .
3. K. R Padiyar.; "High Voltage Direct current Transmission" ;Wiely Esatern Ltd New Delhi .

Suggested List of Laboratory Experiments :- (Expandable): Nil.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total	External (70)	Internal (30)	Total (100)
MTPS1206	Power System Analysis Lab	-	-	2	External (Nil)	Internal (Nil)	Nil	Min: 28 (D Grade)	Nil	Min: Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: Nil.	Best of Two Mid Semester Test – Max Marks:-Nil	Assignment/Quiz/Attendance- Max. Marks:-Nil
Practical Internal Max Marks: 30	Lab work & Sessional – Max Marks:-15	Assignment / Quiz/Attendance - Max. Marks:-15

Pre-Requisite	Knowledge about Power System Faults.
Course Outcome	1. Knowledge about the various power system faults and causes. 2. Acquire the knowledge of load flow studies. 3. Understanding the simulation of Circuit Breakers.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:**-General consideration, Power Handling Capabilities of HVDC & HVAC Lines, Basic Conversion principles, three phase circuits.	**100**

Text Book/References Books/ Websites

1. A. Chakrabarti, M.L. Soni, P. V. Gupta, U. S. Bhatnagar; "A text book on Power System Engineering", Dhanpat Rai and Co.
2. Paithankar.Y.G and Bhide.S.R; "Fundamentals of Power System Protection", Prentice-Hall of India.
3. Badri Ram and Vishwakarma.D.N; "Power System Protection and Switchgear", Tata McGraw- Hill Publishing Company.
4. Arun K. Phadke, James. S. Thorp, "Computer relaying for Power system", John Wiley and sons, New York.

Suggested List of Laboratory Experiments :- (Expandable):

1. Analysis of Three Phase Star connected system under balanced and unbalanced loads.
2. Write a program for formation of Y bus by singular matrix transformation.
3. Study of load flow methods a) Gauss Siedal method b) Newton Raphson method.
4. Write a program for fault analysis for a) LG b) LLG c) LLL.
5. Selection of Circuit Breaker for Three Phase Short Circuit Fault.
6. Write a program to form Z-bus matrix.
7. Simulation of Circuit Breaker for Three Phase Short Circuit Fault.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total	External (70)	Internal (30)	Total (100)
MTPS1207	MATLAB/ SIMULINK	-	-	2	External (Nil)	Internal (Nil)	Nil	Min: 28 (D Grade)	Nil	Min: 40 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: Nil.	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 30	Lab work & Sessional – Max Marks: 15	Assignment /Quiz/Attendance Max. Marks: 15

Pre-Requisite	Nil
Course Outcome	1. Acquire skills of using computer packages MATLAB coding.
	2. Acquire skills of SIMULINK in power system studies.
	3. Ability to understand the knowledge of building blocks of Power Systems.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction: -** State space representation of systems of different kind. Simulation of the state model. Describing equations and different kinds of models.	**100**

Text Book/References Books/ Websites

1. Shailendra Jain; "Modeling and Simulation using MATLAB – Simulink"; Wiley.
2. Agam Kumar Tyagi; "MATLAB and Simulink for Engineers"; Oxford Higher Education.
3. Amos Gilat; "MATLAB: An Introduction with Applications"; Wiley.

Suggested List of Laboratory Experiments :- (Expandable):

1. Single phase half controlled converter using R and RL load using MATLAB / SIMULINK.
2. Single phase fully controlled converter using R and RL load using MATLAB / SIMULINK.
3. Three phase fully controlled converter using R and RL load using MATLAB / SIMULINK.
4. Single phase AC voltage regulator using MATLAB / SIMULINK.
5. Formation of Y bus matrix by inspection / analytical method using MATLAB Software.
6. Formation of Z bus using building algorithm using MATLAB Software.
7. Gauss Seidal load flow analysis using MATLAB Software.
8. Newton Raphson method of load flow analysis using MATLAB Software.
9. Fast decoupled load flow analysis using MATLAB Software.
10. Fault analysis using MATLAB Software.
11. Economic dispatch using MATLAB Software.

PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2019-20 onwards)

Programme: **Master of Technology** **Specialization: Power Systems** **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (50)	External	Internal	Total
MT 1208	Audit Course - II (English For Research Paper Writing)	2	-	-	External (35)	Internal (15)	Min: 20 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz/Attendance Max. Marks: Nil

Pre-Requisite	Nil**.**
Course Outcome	1. Student will understand that how to improve your writing skills and level of readability.
	2. Learn about what to write in each section of research article.
	3. Understand the skills needed when writing a Title.

Unit	Contents (Theory)	Marks Weightage
I	Planning and Preparation; Word Order; Breaking up long sentences; Structuring Paragraphs and Sentences; Being Concise and Removing; Redundancy; Avoiding Ambiguity and Vagueness.	**07**
II	Clarifying Who Did What; Highlighting Your Findings; Hedging and Criticizing; Paraphrasing and Plagiarism; Sections of a Paper; Abstracts; Introduction.	**07**
III	Review of the Literature; Methods; Results; Discussion; Conclusions; The Final Check.	**07**
IV	Key skills are needed when writing a Title; key skills are needed when writing an Abstract; key skills are needed when writing an Introduction; skills needed when writing a Review of the Literature.	**07**
V	Skills are needed when writing the Methods; skills needed when writing the Results; skills are needed when writing the Discussion; skills are needed when writing the Conclusions; useful phrases; how to ensure paper is as good as it could possibly be the first- time submission	**07**

Text Book/References Books/ Websites

1. R. Goldbort (2006) Writing for Science; Yale University Press (available on Google Books).
2. R. Day (2006) How to Write and Publish a Scientific Paper; Cambridge University Press
3. N Highman (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

Suggested List of Laboratory Experiments :- (Expandable): Nil.