PEOPLE'S UNIVERSITY, BHOPAL

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MT13101	Industrial Safety	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	Functioning of Engineering equipments and industry work culture.
Course Outcome	1. Student should able to apply standard safety procedures in an industrial environment. 2. An ability to identify, formulate, and solve broadly-defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the safety.

Unit	Contents (Theory)	Marks Weightage
I	**Industrial Safety:** Accident; causes; types; results and control; mechanical and electrical hazards; types; causes and preventive steps/procedure; describe salient points of factories act 1948 for health and safety; wash rooms; drinking water layouts; light; cleanliness; fire; guarding; pressure vessels; etc; Safety color codes. Fire prevention and firefighting; equipment and methods.	**14**
II	**Fundamentals of Maintenance Engineering:** Definition and aim of maintenance engineering; Primary and secondary functions and responsibility of maintenance department; Types of maintenance; Types and applications of tools used for maintenance; Maintenance cost & its relation with replacement economy; Service life of equipment.	**14**
III	**Wear and Corrosion and their Prevention:** Wear- types; causes; effects; wear reduction methods; lubricants-types and applications; Lubrication methods; general sketch; working and applications of Screw down grease cup; Pressure grease gun; Splash lubrication; Gravity lubrication; Wick feed lubrication; Side feed lubrication; Ring lubrication; Definition; principle and factors affecting the corrosion; Types of corrosion; corrosion prevention methods.	**14**
IV	**Fault Tracing:** Fault tracing-concept and importance; decision tree concept; need and applications; sequence of fault finding activities; show as decision tree; draw decision tree for problems in machine tools; hydraulic; pneumatic; automotive; thermal and electrical equipment's like;. Any one machine tool; Pump ;Air compressor; Internal combustion engine; Boiler; Electrical motors; Types of faults in machine tools and their general causes.	**14**
V	**Periodic and Preventive Maintenance**: Periodic inspection-concept and need; degreasing; cleaning and repairing schemes; overhauling of mechanical components; overhauling of electrical motor; common troubles and remedies of electric motor; repair complexities and its use; definition; need; steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: Machine tools; Pumps; Air compressors; schedule of preventive maintenance of mechanical and electrical equipment; advantages of preventive maintenance. Repair cycle; concept and importance.	**14**

Text Book/References Books/ Websites:

1. Higgins & Morrow; "Maintenance Engineering Handbook"; Da Information Services.
2. H. P. Garg; "Maintenance Engineering"; S. Chand and Company.
3. Audels; "Pump-hydraulic Compressors"; Mcgrew Hill Publication.

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 –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MT13102	Waste to Energy	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	Nil
Course Outcome	1. Student should able to apply the knowledge about the operations of Waste to Energy Plants.
	2. Apply the knowledge in planning and operations of Waste to Energy plants.
	3. Able to analyze the various aspects of Waste to Energy Management Systems.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Energy from Waste:** Classification of waste – agro based, forest residues, domestic waste, industrial waste (hazardous and non-hazardous). Characterization of waste for energy utilization; Conversion devices – Incinerators, gasifiers, digestors ;Waste production in different sectors i.e. domestic, industrial, agriculture, postconsumer waste etc. Waste Selection criteria.	**14**
II	**Technologies for Waste to Energy Biochemical Conversion** – Energy production from organic waste through anaerobic digestion and fermentation. Thermo-chemical Conversion – Combustion, Incineration and heat recovery, Pyrolysis, Gasification; Plasma Arc Technology.	**14**
III	**Waste to Energy Options**: Landfill gas, collection and recovery. Refuse Derived Fuel (RDF) – fluff, briquettes, pellets. Alternate Fuel Resource (AFR) – production and use in Cement plants, Thermal power plants and Industrial boilers. Conversion of wastes to fuel resources for other useful energy applications. Energy from Plastic Wastes – Non-recyclable plastic wastes for energy recovery. Energy Recovery from wastes and optimization of its use, benchmarking and standardization.	**14**
IV	**Centralized and Decentralized Waste to Energy Plants**: collection, segregation, transportation and storage requirements. Location and Siting of 'Waste to Energy' plants. Industry Specific Applications – In-house use – sugar, distillery, pharmaceuticals, Pulp and paper, refinery and petrochemical industry and any other industry. Centralized and Decentralized Energy production, distribution and use. Comparison of Centralized and decentralized systems and its operations.	**14**
V	**Waste To Energy & Environmental Implications**: Environmental standards for Waste to Energy Plant operations and gas clean-up;Savings on non-renewable fuel resources;Carbon Credits: Carbon foot calculations and carbon credits transfer mechanisms;Energy Analysis; Global Best Practices in Waste to energy production and use. Indian Scenario on Waste to Energy production distribution and use in India. Role of the Government in promoting 'Waste to Energy'.	**14**

Text Book/References Books/ Websites:

1. Industrial and Urban Waste Management in India; TERI Press.
2. Banwari Lal and Patwardhan; "Wealth from Waste: Trends and Technologies"; TERI Press.
3. S.N Mukhopadhyay; "Fundamentals of waste and Environmental Engineering"; TERI Press.
4. www.envfor.nic.in www.cpcb.nic.in
5. www.teriin.org/projects/green/pdf/National-Waste.pdf

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 –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MT13103	Cost Management of Engineering Projects	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	Nil
Course Outcome	1. Students should able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
	2. Able to carry out and evaluate benefit/cost, life cycle and Breakeven analyses on one or more economic alternatives.

Unit	Contents (Theory)	Marks Weightage
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.	14
II	Project: meaning; Different types; why to manage; cost overruns centers; various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical 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	14
III	Project commissioning: mechanical and process 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. Standard Costing and Variance Analysis.	14
IV	Pricing strategies: Pareto Analysis. Target costing; Life Cycle Costing. Costing of service sector. Just-in-time approach; Material Requirement Planning; Enterprise Resource Planning; Total Quality Management and Theory of constraints. Activity-Based Cost Management; Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.	14
V	Quantitative techniques for cost management; Linear Programming; PERT/CPM; Transportation problems; Assignment problems; Simulation; Learning Curve Theory.	14

Text Book/References Books/ Websites:

1. Cost Accounting A Managerial Emphasis; "Prentice Hall of India"; New Delhi.
2. Charles T. Horngren and George Foster; "Advanced Management Accounting";TMH .
3. Robert S Kaplan Anthony A. Alkinson; "Management & Cost Accounting"; PHI.
4. Ashish K. Bhattacharya; "Principles & Practices of Cost Accounting"; A. H. Wheeler publisher.
5. N.D. Vohra; "Quantitative Techniques in Management"; Tata McGraw Hill Book Co. Ltd.

Suggested List of Laboratory Experiments (Expandable): Nil.

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External	Internal	Total
MTPS13201	Advanced Electrical Drives	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: 15	Lab work & Sessional – Max Marks: Nil	Assignment/Quiz/Attendance- Max. Marks: Nil

Pre-Requisite	Knowledge of Electrical Machines and Power Electronics.
Course Outcome	1. Review of conventional methods & convertor control methods used in speed control of I.M.
	2. Various power recovery schemes in AC drives to improve the efficiency of the drives in industry.
	3. Analysis of special drives and digital control of drives used in modern technologies.

Unit	Contents (Theory)	Marks Weightage
I	Electrical Drives Introduction, Choice of Electrical Drives, Dynamics of Electrical Drives, Concept of Multi-quadrant operation, Components of load torques. Selection of motor power rating.	**14**
II	D.C.Drive, speed torque, speed control. Starting, Breaking. Controlled rectified fed DC drive, chopper controlled dc drives. Close loop control of d.c. drive. Introduction of transient analysis.	**14**
III	Induction Motor Drives : Three phase I.M., analysis and performance. Operation with unbalanced source voltages and single phasing, analysis of I.M. fed from Non-sinusoidal voltage supply. Starting, Breaking, Introduction of transient analysis. Speed control methods, single phase I.M. Close loop control of I.M. Drives.	**14**
IV	Synchronous Motor Drives, cylindrical rotor wound field motor, salient pole wound field motor, synchronous reluctance motor, Hysterisis synchronous motor, operation from fixed frequency supply, starting, breaking, synchronous motor variable speed drives, starting large synchronous machines	**14**
V	Introduction of Brushless dc motor, stepper motor and switch reluctance motor drives, solar and battery powered drives, Traction Drives, Energy conservation in Electrical Drives.	**14**

Text Book/References Books/ Websites.

1. G.K.Dubey; "Power semi conductor controlled drives"; Narosa Publishing House.
2. G.K.Dubey; "Fundamentals of Electrical Drives";Narosa Publishing House.
3. P.C.Sen; "Electrical Machine & Power Electronics"; Kailash Publications.

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

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTPS13202	Transient Over Voltages & Power 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: 15	Lab work & Sessional – Max Marks: Nil	Assignment/ Quiz/Attendance Max. Marks: Nil

Pre-Requisite	Knowledge of various faults and their causes in the Power systems and related terms.
Course Outcome	1. Analyze the Power Systems Transient and causes.
	2. Knowledge of Power System protection techniques.
	3. Knowledge of Generation of high AC and DC impulse.

Unit	Contents (Theory)	Marks Weightage
I	Transients in electric power systems – Internal and external causes of over voltages-– Lightning strokes – Mathematical model to represent lightning, Travelling waves in transmission lines – Circuits with distributed constants – Wave equations – Reflection and refraction of travelling waves – Travelling waves at different line terminations.	**14**
II	Switching transients –double frequency transients – abnormal switching transients – Transients in switching a three phase reactor- three phase capacitor.	**14**
III	Voltage distribution in transformer winding – voltage surges-transformers – generators and motors, Transient parameter values for transformers,reactors,generators and transmission lines.	**14**
IV	Basic ideas about protection –surge diverters-surge absorbers-protection of lines and stations Modern lighting arrestors,Insulation coordination,Protection of alternators and industrial drive systems.	**14**
V	Generation of high AC and DC-impulse voltages,currents-measurement using sphere gaps-peak voltmeters-potential dividers and CRO.	**14**

Text Book/References Books/ Websites

1. Allen Greenwood; "Electrical transients in power systems", Wiley Interscience, 1991
2. Bewley, L.W.;"Travelling waves and transmission systems"; Dover publications, New York, 1963.
3. Gallaghar, P.J. and Pearmai;," A.J., 'High voltage measurement, Testing and Design";John Wiley and sons, New York, 2001.

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

PEOPLE'S UNIVERSITY, BHOPAL

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

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External	Internal	Total
MTPS13203	Voltage Stability of Power 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: 15	Lab work & Sessional – Max Marks: Nil	Assignment/Quiz/Attendance- Max. Marks: Nil

Pre-Requisite	Knowledge of Power System transient, stability and power quality.
Course Outcome	1. Knowledge of Voltage stability and voltage collapse etc.
	2. Graphical analysis of Voltage Stability.
	3. Knowledge about the various loads that influence Voltage Stability.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction to Voltage Stability**:Definitions: Voltage Stability, Voltage Collapse, Voltage Security; Physical relation indicating dependency of voltage on reactive power flow; Factors affecting Voltage collapse and instability; Previous cases of voltage collapse incidences.	**14**
II	**Graphical Analysis of Voltage Stability**:Comparison of Voltage and angular stability of the system; Graphical Methods describing voltage collapse phenomenon: P-V and Q-V curves; detailed description of voltage collapse phenomenon with the help of Q-V curves.	**14**
III	**Analysis of Voltage Stability**:Analysis of voltage stability on SMLB system: Analytical treatment and analysis.**Voltage Stability Indices:**Voltage collapse proximity indicator; Determinant of Jacobin as proximity indicators; Voltage stability margin	**14**
IV	**Power System Loads** Loads that influences voltage stability: Discharge lights, Induction Motor, Air-conditioning, heat pumps, electronic power supplies, OH lines and cables. **Reactive Power Compensation:** Generation and Absorption of reactive power; Series and Shunt compensation; Synchronous condensers, SVC s; ; Booster Transformers.	**14**
V	**Voltage Stability Margin**:Stability Margin: Compensated and un-compensated systems. **Voltage Security**: Definition; Voltage security; Methods to improve voltage stability and its practical aspects.	**14**

Text Book/References Books/ Websites

1. D.P.Kotari , A.K.Mukopadyay, A.Chakrabarthy; "Performance, operation and control of EHV power transmission system";A.H.Wheeler Publishing.
2. K.R.Padiyar; "Power System Dynamics: Stability and Control"; B.S.Publications
3. C.W.Taylor; "Power System Voltage Stability"; Mc Graw Hill.

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 –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (200)	Internal (100)	Total (300)
MTPS1303	Pre-Dissertation	-	-	6	External (Nil)	Internal (Nil)	Nil	Min: 80 (D Grade)	Min: Nil	Min: 120 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 300	Lab work & Sessional – Max Marks: 50	Assignment / Quiz/Attendance Max. Marks: 50

Pre-Requisite	Knowledge of concerned discipline of Engineering.
Course Outcome	1. Identify literature and problem identification of research.
	2. Apply engineering principles through efficient handling of project.
	3. Identify appropriate techniques to analyze complex engineering problems.

Unit	Contents (Theory)	Marks Weightage
	Pre- Dissertation: Students are required to select a topic of their interest in the third semester and prepare a dissertation on it. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available. End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions and must bring out individuals contribution. The student must submit a synopsis at the end of the semester for the approval from the research Approval committee in the specified format and submitted to the university for further Approval and give the power point presentation of the same for Evaluation/Approval.	**300**

Text Book/References Books/ Websites: Nil.

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