Vardhaman College of Engineering (Autonomous)
Department of Electrical and Electronics Engineering

NAME OF THE PROGRAM: M. TECH (PEED) **REGULATIONS: R21**

Course Outcomes

1. B5301 - Power Electronic Converters

B5301.1 Analyse the performance of power semiconductor switched circuits with various loads.
B5301.2 Analyse the performance of AC-DC converters for the specified applications.
B5301.3 Analyse and design the performance of DC-DC converters to meet specific requirements.
B5301.4 Apply PWM techniques to enhance the performance of inverters.
B5301.5 Analyse and design the performance of AC-AC converters to meet specific requirements.

2. B5302 - Electrical Drives System

B5302.1 Apply the basic electrical knowledge to understand the load torque and its components of electrical drives.
B5302.2 Analyse the torque equations and Speed control methods of different Electrical drives.
B5302.3 Compare the operation of phase controlled and chopper controlled DC drives.
B5302.4 Analyze the dynamic modelling and speed control of poly phase induction machines.
B5302.5 Analyze the characteristics of traction drives and industrial drives.

3. B5303 - Electrical Drives Laboratory

B5303.1 Make use of different methods to control the speed of the Induction motor using power electronic converters.
B5303.2 Apply closed loop control technique to control the speed of the DC motor and PMDC motor.
B5303.3 Analyze the four quadrant operation of a DC motor and a PMDC motor with a suitable chopper drive.
B5303.4 Apply the basic principles of power electronic converters to study the operation of a half controlled and fully controlled converter with inductive load

4. B5304 - Power Electronics Simulation Laboratory – I

B5304.1 Use modern tool simulator to simulate and analyse the basic power electronic converters with various loads.
B5304.2 Use modern tool simulator as a learning aid and gain understanding into the working of various basic power electronic converters.
B5304.3 Use modern tool simulator as an aiding tool to design basic power electronic converters.

5. B5305 - Modeling and Analysis of Electrical Machines

B5305.1 Apply the principles of science and engineering to model the electrical machines.
B5305.2 Develop a mathematical model of DC machine using reference frame theory to determine its equivalent circuit parameters.
B5305.3 Model an Induction machine using reference frame theory to determine its equivalent circuit parameters.
B5305.4 Develop a mathematical model of a synchronous machine using reference frame theory to determine its equivalent circuit parameters.
B5305.5 Develop a mathematical model of Switched Reluctance motor and permanent magnet machines.

6. B5306 - Digital Control of Power Electronic and Drives Systems

B5306.1 Apply numerical methods to solve transients DC and AC networks..
B5306.2 Model power electronic devices and its gate drive/base drive circuits in MATLAB/Simulation..
B5306.3 Design electrical machines in MATLAB to observe it characteristics and stability in different loading conditions.
B5306.4 Simulate single phase and three phase converters with DC motor drives and also the power factor correction schemes..
B5306.5 Simulate single phase and three phase inverters with induction motor drives by applying various PWM techniques.

7. B5307 - Electrical Drives Simulation Laboratory

B5307.1 Make use of MATLAB simulink to control the speed of the Induction motor using power electronic converters.
B5307.2 Apply closed loop control technique using MATLAB simulink to control the speed of the PMDC motor.
B5307.3 Analyze the four quadrant operation of a chopper controlled DC motor drive using MATLAB simulink.
B5307.4 Apply the basic principles of power electronic converters to study the operation of a single phase and three phase DC motor drive using MATLAB simulink.

8. B5308 - Power Electronics Simulation Laboratory – II

B5308.1 Use modern tool simulator to simulate and analyse the advanced power electronic converters.

B5308.2 Use modern tool simulator as a learning aid and gain understanding into the working of various power electronic converters.

B5308.3 Use modern tool simulator as an aiding tool to design power electronic converters.

B5308.4 Use modern tool to simulate and analyse the different modulation techniques to pulse width modulated inverters and identify the harmonic reduction methods.

9. B5351 - Energy Storage Systems

B5351.1 Apply the knowledge of concepts of science to understand the concepts of electrochemical cell.

B5351.2 Apply the knowledge of electrochemistry to describe the components and process in batteries.

B5351.3 Describe the electrical, thermal, and mechanical behavior of Li-Ion batteries under various operating conditions.

B5351.4 Apply the knowledge of basic science concepts to distinguish various types of fuel cells and their functionalities.

B5351.5 Apply the knowledge of science to interpret the operation and characteristics of super capacitors.

10. B5352 - PWM Converters and Applications

B5352.1 Analyse the rectifiers and inverter circuits.

B5352.2 Calculate switching losses in various power electronic circuits..

B5352.3 Analyse various multilevel inverters and select best converter for given application..

B5352.4 Apply different PWM techniques for a given converter to reduce current and torque ripple.

B5352.5 Apply suitable technique for harmonic compensation and reactive power compensation.

11. B5353 - Power Quality

B5353.1 Analyse the severity of power quality problems in distribution system.

B5353.2 Analyse the various causes of voltage flicker and their effects and various means to reduce flickers.

B5353.3 Apply the advanced techniques to minimise sag/swell and interruptions for improve power quality.

B5353.4 Apply the knowledge of harmonic mitigating techniques to improve the performance of system.

B5353.5 Identify the best approaches followed in power quality monitoring.

12. B5354 - Static VAR Controllers and Harmonic Filtering

B5354.1 Apply fundamental principles of Passive and Active Reactive Power Compensation Schemes to Transmission and Distribution level in Power Systems.

B5354.2 Analyze analytical modeling and analysis of Static VAR compensator.

B5354.3 Analyze various single phase and three-phase Static VAR Compensation schemes and their controls.

B5354.4 Analyze analytical modeling and analysis of active and passive filters.

13. B5355 - Electric and Hybrid Vehicles

B5355.1 Infer the electric vehicle system and its impact on environment.

B5355.2 Analyze the various hybrid vehicle configurations and its performance.

B5355.3 Interpret the electric drives used in hybrid and electric vehicles.

B5355.4 Choose proper energy storage systems for electric vehicle applications.

B5355.5 Analyse the significance of electric vehicle in Indian society.

14. B5356 - Micro-Grid Technologies

B5356.1 Classify different types of micro grids.

B5356.2 Apply power electronic converters and controllers in micro grid.

B5356.3 Analyze energy management system with micro grids.

B5356.4 Analyze protection schemes in micro grids.

15. B5357 - Switched Mode and Resonant Converters

B5357.1 Understand soft switching techniques and its applications.

B5357.2 Apply suitable PWM control IC for a given requirement.

B5357.3 Apply pulse width modulated techniques to various converters.

B5357.4 Analyse and design switched mode power converters.

B5357.5 Design a transformer and filter as per the requirement in the converter circuit.

16. B5358 - Industrial Load Modelling and Control

B5358.1 Develop models of various industrial loads.

B5358.2 Analyse electricity pricing and demand side management of industrial loads.

B5358.3 apply control strategies for cooling loads, heating loads, reactive power management.

B5358.4 Analyse captive power units, optimal operating strategies for industrial loads.

17. B5359 - Digital Control Systems

B5359.1 Apply the Sampling quantization and reconstruction in ADC conversion and DCA conversion.

B5359.2 Analyse a discrete system in time domain, frequency domain and Z domain.

B5359.3 Inspect Controllability and Observability of digital systems.

B5359.4 Analyse the stability methods of Z - Transform in digital systems.

18. B5360 - Applications of Power Electronic Converters

B5360.1 Analyze the requirements of power electronic converters in lighting systems.
B5360.2 Identify and analyze converter configurations used in induction heating applications.
B5360.3 Identify suitable power converter for electric vehicles from the available configurations.
B5360.4 Identify configuration of power converters required for a given renewable energy system.
B5360.5 Develop power converters for utility application requirements.

19. B5361 - Distributed Generation

B5361.1 Find the size and optimal placement DG.
B5361.2 Analyze the impact of grid integration and control aspects of DGs.
B5361.3 Model and analyze a micro grid taking into consideration the planning and operational issues of the DGs to be connected in the system.
B5361.4 Describe the technical impacts of DGs in power systems.

20. B5362 - Smart Grids

B5362.1 Describe about smart grid and internet of Energy Systems.
B5362.2 Describe different measuring methods and sensors used in smart grid.
B5362.3 Introduce advanced architectures used in Smart Grid Network.
B5362.4 Evaluate technology options pertaining to renewable energy generation, data handling and communications for Smart Grids.

21. B5363 - SCADA System and Applications

B5363.1 Identify fundamental concepts of SCADA applications in a Bulk Electrical System setting.
B5363.2 Select SCADA system components for industry applications.
B5363.3 Analyze SCADA architecture and communications methods.
B5363.4 Apply different SCADA techniques for industry applications.

22. B5364 - Facts and Custom Power Devices

B5364.1 Distinguish the performance of Transmission line with and without FACTS Devices.
B5364.2 Compare the SVC and STATCOM.
B5364.3 Understand the operation and control of various Static Series Compensators.
B5364.4 Analyse the control techniques of Unified Power Flow Controller.
B5364.5 Distinguish various power quality issues and how are they mitigated by various FACTS Devices.

23. B5365 - High Voltage DC Transmission

B5365.1 Identify the HVDC technology and conversion principles used in power transmission.

B5365.2 Analyze the converters used in HVDC transmission systems.
B5365.3 Construct Multi-terminal HVDC systems and various harmonics filter and their control.
B5365.4 Develop dynamic Model for HVDC Systems.