ALIGARH MUSLIM UNIVERSITY, ALIGARH

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS FOR

MASTER OF TECHNOLOGY (M.TECH.) – ELECTRICAL ENGINEERING

1. **ELECTRICAL MACHINES** : Construction, performance, testing and Parallel operation of transformers, Autotransformers and three-winding transformer, Construction, performance starting and testing of three-phase and single – phase induction motors, Induction generators. Construction, modeling and performance of salient and non-salient pole synchronous machines. DC Machines; Construction, working principle and characteristics of de motor and generator. Starting and testing of dc machines. Special motors : Universal motor, permanent magnet DC machines, hysteresis motor, reluctance motor, stepper motor etc.

2. **POWER SYSTEM ENGINEERING** : Electrical Characteristics of O.H. Lines, Performance of OH transmission lines, insulators and mechanical design of OH lines, under ground cables, installation and substation. Load flow analysis, economic operation of power system, fault analysis, stability analysis, distribution systems. Electrical Power Generation : Thermal power plants, hydro electric power plants, nuclear power plants, diesel and gas plants, cogeneration and captive power generation. Power System Protection : Protective relay, protection scheme, circuit breakers, Power system transients.

3. **ELECTRICAL MEASUREMENT AND INSTRUMENTATION** : Standards and Errors of Measurement, Electromechanical Instruments, Bridges and Potentiometers, Instrument Transformers and Recorders, wattmeters and energy meters. Digital instruments, Display Devices Data transmission : Transducers. Special Instruments : Synchroscope, maximum demand indicator, trivector meter, measurement of iron loss, measurement of high voltage by sphere-gap.

4. **CIRCUIT THEORY** : Network analysis and transient response, resonance and magnetic circuit, network theorems, network functions, two port networks. Special networks and multiport networks, electric filters, realization of network function, graph theory and network equation, state variable analysis.

5. **POWER ELECTRONICS** : Power Semiconductor Devices and their Characteristics, Triggering Circuits. AC-DC Converters, DC-DC Converters, Inverters, AC voltage regulators, SMPS and UPS,

Thyristor controlled resistors, inductors and capacitors. Resonant converters. Dual and cyclo converters.

6. **ELECTRIC DRIVES** : Characteristics of different types of mechanical loads, stability of motor-load systems. Thermal loading of motors, estimation of motor rating for different types of loads. Different methods of speed control and electric braking of DC motors. Rectifier controlled and chopper controlled DC motor drives. Methods of speed control and electric braking of induction motors. Closed Loop AC and DC Drives. Microprocessor controlled Electric Drives.

7. **CONTROL SYSTEM** : Components of control system, Mathematical modeling of mechanical and electrical systems. Block diagram and signal flow diagram representation and transfer function of control systems. Time domain and frequency domain analysis. Control System Design : Phase lead and lag compensation. System analysis using state variables. Discrete Data System, Digital controllers, Stability of digital control system. State Feedback Technique for continuous and discreet systems-their analysis and stability Analysis and Stability of non-linear Systems.

8. **MICROPROCESSOR SYSTEM** : Elements of Microcomputer, Architecture and assembly language programming of 8085 and 8086 microprocessors. Input-output techniques and data transfer. Memory and Input – output interface.

9. **ELECTROMAGNETIC FIELD THEORY** : Electrostatic field, magnetostatic fields, time varying field, application of field theory.

10. **SIGNAL AND SYSTEMS** : Signal representation, system representation and modeling, system analysis techniques, digital filters.