

Electrical Engineering Paper-1 Syllabus :

This part is for both objective and conventional types papers :

1) EM Theory-

The electromagnetic force is said to be one of the fundamental interactions in nature also this force is described by electromagnetic fields and has incalculable physical instances. This includes

Electric and magnetic fields. Fields in dielectrics, conductors and magnetic materials. Gauss's Law and Amperes Law .Maxwell's equations. Plane-Wave propagating in dielectric and conducting media. Time varying fields. Transmission line.

2)Electrical Materials-

Electrical Materials may be referred to a metal, dielectrics ,electrical insulators or conductors ,paramagnetic materials and many other .This includes

Band Theory, Conductors, Insulators and Semi-conductors . Super-conductivity. Insulators for electrical and electronic applications. Magnetic materials. Ceramics, Properties and applications. Hall effect and its applications. Ferro and ferri magnetism. Special semi conductors.

3) Electrical Circuits –

It is an interconnection of electrical elements such as inductors ,resistors,capacitors, current sources, voltage sources and switches. An electrical circuit is a system consisting of a closed loop giving a return pathway for the current. This include

Circuits elements. Kirchoff's Laws. Network Theorems and applications. Mesh and nodal analysis. Transient response and steady state response for arbitrary inputs. Transfer function. Threephase circuits. Two-port networks. Resonant circuits. Natural response and forced response. Properties of networks in terms of poles and zeros. Elements of two-element network synthesis.

4) Measurements and Instrumentation –

A Measuring instrument is used for measuring a physical quantity also. Measuring instruments are recognized test methods which characterize the instrument usage. All measuring instruments are subject to varying degrees of measurement uncertainty and instrument error. This includes

Units and Standards. Indicating instruments. Error analysis, Voltage, power, measurement of current, Power-factor and energy. Bridge measurements. Measurement of Capacitance, frequency, inductance and resistance. Digital Voltmeter and frequency counter. Electronic measuring instruments. A/D and D/A converters. Transducers and their applications to the measurement of non-electrical quantities like temperature, flow-rate displacement, pressure, noise level, acceleration etc. Data acquisition systems.

5) Control System-

A control system is a set of devices which manages, directs and commands the performance of other devices. Control systems are used in industrial production. This includes

Block diagrams and signal flow graphs and their reduction. Mathematical modelling of physical systems. Errors for different type of inputs and stability criteria for feedback systems. Time domain and frequency domain analysis of linear dynamical system. Root locus and Nicols chart and the estimation of gain and phase margin. Stability analysis using Routh-Hurwitz array, Nyquist plot and Bode plot. State variable matrix and its use in system modelling and design. Basic concepts of compensator design. Stability of sampled data system. Sampled data system and performance of such a system with the samples in the error channel. Control system components, electromechanical, hydraulic, pneumatic components. Elements of non-linear control analysis.

Electrical Engineering Paper-2 Syllabus :

This part is for both objective and conventional types papers :

1) Electrical Machines and Power Transformers –

An electrical machine is used to convert mechanical energy to electrical energy, motors which convert electrical energy to mechanical energy, and transformers which changes the voltage level of an alternating current . This includes

Magnetic Circuits – Analysis and Design of Power transformers. Parallel operation. Construction and testing. Equivalent circuits.

Regulation. Losses and efficiency. 3-phase transformer, Auto-transformer,. Basic concepts in rotating machines. B.C. Machines. Construction and operation, leakage losses and efficiency. Excitation methods ,Construction. Circuit models. EMF, torque, basic machine types. Armature reaction and commutation. Testing, Losses and efficiency. Generators and motors. Characteristics and performance analysis. Starting and speed control.

Synchronous Machines. Construction. Salient-pole machine, Parallel operation. Synchronous reactance. Efficiency. Circuit model. Operating characteristics and performance analysis. Short circuit transients. Hunting. Voltage regulation.

Induction Machines. Construction. Rotating fields. Principle of operation. Characteristics and performance analysis. Circle diagram. Determination of circuit model. Fractional KW motors. Starting and speed control. Single-phase synchronous and induction motors.

2) Power systems –

It's a system of electrical components used to transmit , supply and uses electric power. An instance of an electric power system is the set of connections that provisions a regions like homes and industry with power .This include

Types of Power Stations, Thermal , Hydro and Nuclear Stations. Pumped storage plants.

Power transmission lines. Economics and operating factors. Voltage control. Modeling and performance characteristics. Load flow studies. Optimal power system operation. Symmetrical short circuit analysis. Load frequency control. ZBus formulation. Fault analysis. Symmetrical Components. Transient and steady-state stability of power systems. Equal area criterion. Per Unit representation.

Power system Transients. Relays. HVDC transmission. Power system Protection Circuit breakers.

3) Digital And Analog Electronics and Circuits –

In analog electronics voltages and currents can take on virtually any value. Thus, in an analog circuit information tends to be conveyed by the magnitude of the current or voltage signal. Digital electronics is that division of electronics that deals with logic gates, flip-flops, counters, the digital integrated circuit chip. This includes

Semiconductor device physics, circuit models and parameters, PN junctions and transistors FET, Zener, Schottky, tunnel, photo diodes and their applications, rectifier circuits, voltage regulators and multipliers, switching behavior of diodes and transistors.

Small signal amplifiers, frequency response and improvement, biasing circuits, multistage amplifiers and feed-back amplifiers, Oscillators, D.C. amplifiers. Large signal amplifiers, push pull amplifiers, coupling methods, operational amplifiers, wave shaping circuits. Digital logic gate families, sequential logic circuits, universal gates-combination circuits for arithmetic and logic operational. Multivibrators and flip-flops and their applications. Counters, registers, RAM and ROMs.

4) Microprocessors-

A microprocessor incorporates the functions of a central processing unit of a computer on a single integrated circuit as well as few integrated circuits. Microprocessors work on numbers that are represented in the binary number system.

Microprocessor architecture-Instruction set and simple assembly language programming.
Applications of Micro-processors in power system. Interfacing for memory and I/O.

5) Communication Systems-

This system is a collection of communications networks, relay stations, tributary stations, transmission systems usually capable of interconnection as well as interoperation to form an integrated system.

Types of modulation; AM, PM and FM. Demodulators. Digital communication systems. Noise and bandwidth considerations. Carrier communication. Pulse code modulation and demodulation. Telemetry system in power engineering, Frequency division and time division multiplexing. Elements of sound and vision broadcasting.

6) Power Electronics –

Power electronics is referred to a subject of examine in electronic and electrical engineering which deals with control, design, calculation and assimilation of time varying energy processing electronic systems .This time

Power Semiconductor devices. Thyristor. Power transistor, GTOs and MOSFETS. AC to DC Converters; AC regulators; 1-phase and 3-phase DC to DC Converters. Thyristor controlled reactors; switched capacitor networks. Characteristics and operation.

single-phase and 3-phase ; Inverters. Sinusoidal modulation with uniform sampling. Pulse width modulation. Switched mode power supplies.

