

ELECTRICAL ENGINEERING

CODE-09

PAPER-I

Net work : Steady state analysis of d.c. and a.c. network theorems Matrix Algebra, network functions, transient response frequency response, Laplace transform, Fourier series and Fourier transform frequency spectral polezero concept, elementary, network synthesis.

Statistics and Magnetics :

Analysis of electrostatic and magnetic fields. Laplace and Poisson equation, Solution of boundary value problems Maxwell's equations, electromagnetic wave, Propagation ground and space waves propagation between earth station and satellites.

Basic methods of measurements standards error analysis indicating instruments, cathode ray oscilloscope measurement of voltage current power resistance inductance capacitance, time frequency and flux electronic meters.

Electronics :

Vacuum and semi-conductor devices equivalent circuits transistor parameters determination of current and voltage gain and input and output impedances biasing techniques single and multi state audio and radio small signal and large signal amplifiers and their analysis, feedback amplifiers and oscillators, wave shaping circuits and time base generators analysis of different types of multivibrator and their uses, digital circuits.

Electrical machines :

Generation of a.m.f.e.m.f. and torque in rotating machines, motor and generator characteristics of d.c. synchronous and induction machines equivalent circuits commutation, parallel operation, phasor diagrams and equivalent circuits of power transformer, determination of performance and efficiency, auto-transformers, 3-phase transformers.

PAPER-II

SECTION-A

Control system :

Mathematical modelling of dynamic linear control system block diagrams and signal flow graphs, transient response, steady state error, stability frequency response techniques, root-locus techniques series compensation.

Industrial Electronics :

Principles and design of single phase and polyphase rectifiers, controlled rectification, smoothing filters, regulated power supplies, speed control circuits for drives invertors, d.c.to a.c. conversion choppers, timers and welding circuits.

SECTION-B

(HEAVY CURRENTS)

Electrical Machines :

Induction Machines - Rotating magnetic field, polyphase motor, principle of operation, phasor diagram or torque slip characteristic equivalent circuit and determination of its parameters, circle diagram,

starter, speed control double cage motor, induction generator theory, phaser diagram characteristics and application of single phase motors. Application of two-phase induction motor.

Synchronous Machines.- e.m.f. equation phaser and circle diagrams, operation on infinite bus, synchronizing power operating characteristics and performance by different methods sudden short circuit and analysis of oscillogram to determine machine reactances and time constant motor characteristics and performance, method of starting applications.

Special Machines- Amplidyne and metadyne, operating characteristics and their application.

Power systems and protection. - General layout and economics and different types of power stations, base load, peak-load and pumped-storage plants, economics of different systems of d.c. and a.c. power distribution transmission line parameter calculation concept of G.M.D. short medium and long transmission line, insulators, voltage distribution in a string of insulators and grading. Environmental effect on insulators, Fault calculation by symmetrical components, load flow analysis and economic operation, steady state and transient stability, switch gear. Methods of arc-extinction re-striking and recovery voltage, testing of circuit breaker, protective relays, protective schemes for power system equipment C.T. and P.T. surges in transmission lines, travelling waves and protection.

Utilisation :- Industrial drive electric motors for various drives, and estimates of their rating, behaviour of motors during starting, acceleration, braking and reversing operations, schemes of speed control for d.c. and induction, motors.

Economics and other aspects of different systems of rail traction, mechanic of train movement and estimation of power and energy requirements and motor ratings, characteristics of traction motors, dielectric and induction heating.

OR

SECTION-C (LIGHT CURRENT)

Communication systems-Generation and detection of amplitude -frequency- phase and pulse-modulate signals using oscillators, modulators and demodulators. Comparison of modulated systems, noise problems, channel efficiency sampling theorem, sound and vision broadcast transmitting and receiving systems, antenna feeders and receiving circuits, transmission line at audio and ultra high frequencies.

Micro-waves :- Electro magnetic waves in guided media, wave guide components, cavity resonator micro waves tubes and solid -state devices, micro-wave generators and amplifiers filters, micro-wave measuring technique micro-wave radiation pattern, communication and antenna systems. Radio aids to navigation.

D.C. Amplifier :- Direct coupled amplifiers, difference amplifiers choppers and analog computation.