Download Bihar Public Service Commission (BPSC Mains)

Optional Subject -

Electrical Engineering

ELECTRICAL ENGINEERING

Section- I

Network:

Steady state analysis of D.C and A.C., networks, network theorems, Matrix Algebra, network functions, transient response, frequency response, Laplace transform, fourier series and fourier transform, frequency spectral plezero concept, elementary network synthesis.

Static and Magnetics:

Analysis of electrostatic and magentostatic fields, Laplace and Poisson Equations, solution of boundary value problems, Maxwell's equations, electromagnetic wave propagation, ground and space waves, prospagation between earth station and satellites.

Measurements:

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

Electronics:

Vaccum and semiconductor devices, equivalent circuits transistor parameters, determination of current and voltage gain and input and output impedances biasing techniques, single and multistage, audio and radio small signal and large signal amplifiers and their analysis reedback amplifiers and oscillators: wave haping circuits and time base generators, analysis of different types of multivilerator and their uses, digital circuits.

Electrical Machines:

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

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Section-II

Part-A

Control systems:

Mathematical modeling of dynamic linear control systems, block diagrams and signal flow graphs, transient surprise response steady state error, stability, frequency response techniques, rootlocus 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 drivers, inverters, d.c to d.c conversion, choppera, timers and welding circuits.

Part – B (Heavy Currents)

Electrical Machines:

Induction Machines- Rotating magnetic field, Polyphase motor, principle of operation phaser diagram, Torque slip characteristic, Equivalent circuit and determination of its parameters, circle diagram, starters, speed control double cage motor, Induction generator. Theory, Phaser diagram, characteristies and application of single phase motors. Application of two phase induction motor.

Synchronous Machines – e.m.f equation phase and circle diagram, operation on infinite bus, synchronçing power, operating characterstic and performance by different methods, sudden short circuit and analysis of oscillogram to determine machine reactances and time constants, motor characteristics and performance methods of starting applications.

Speical Machines – Amplidyne and metadyne operating characteristics, and their applications.

Power system and Protection – General layout and economics of different types of power stations, Baseload, peakload and pumped storage plant, 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 effects on insulators. Fault calculation by symmetrical components, load flow analysis and economic operation steady state and transient stability, Switchgear methods of extinction, Re-strilking and recovery voltage, Testing of ciruit breaker, Protective relays, Protective

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schemes for power system equipment. C.T. and P.T Surges in transmission lines, Travelling waves and protection.

Utilisation – Industrial drives electric motors for various drives and estimates of their rating; Behaviour of motors during starting acceleration, breaking and reversing operation; Schemes of speed control for d.c and induction motors.

Economic and other aspects of different systems of rail traction; mechanies of train movement and estimation of power and energy requirements and motor rating characteristics of traction motors, Dielectic and induction heating.

OR

Part – C (Light currents)

Communication System – Generation and detection of amplitude – frequency phase and Pulsemodulate signals using oscillators, modulators and demodulators, Comparison of modulated systems, noise problems, channel efficiency sampling theorem sound and vision broadcast transmitting and receiving system, antennas, feeders and receiving circuits, transmission line at audio radio and ultra, high frequencies.

Microwaves – Electromagnatic wave in guided media wave guide components cavity resonaters, microwave tubes and solid-state devices, microwave generator and amplifiers, filters microwave measuring techniques, microwave radiation pattern, communication and antenna systems, Radio aids to navigation.

D.C Amplifiers – Direct coupled amplifiers, difference amplifiers, choppers and analog computation.

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