राज्य सेवा परीक्षा

ऐच्छिक विषय

08. विद्युत इंजीनियरी

विद्युत इंजीनियरी विषयों के प्रश्न पत्र केवल अंग्रेजी में होंगे अतएव पाठ्यक्रम केवल अंग्रेजी में ही मुद्रित हैं - (परिशिष्ट एक -पैरा 4 (घ) देखे)

Syllabi for optional subjects

08 ELECTRICAL ENGINEERING

PAPER - I

Networks- Network function, Transient and steady state frequency response, Laplace Transform, Pole Zero analyisis , Elements of Network synthesis-two element network synthesis (LC, RL and RC)

Electromagnetic field and materials- Laplace's and Poisson's equations simple soluitons boundry value problems, maxwell's equation. Electronmagnetic wave propogation. Polarisation, Dielectric constant , dielecric materials, Behaviour of dielectrics in alternating field. Magnetic dipole. classification of magnetic materials. Conductivity, of metal's thermal conductivity super conductivity Classification of semiconductors.

Measurement - Basic methods of measurements. Measurement of frequency and phase using CRO, Measurement of resistance, inductance , mutual inductance and capacitance using bridges, Electronic Measurement, Counters, Use of Opamplifiers in instrumentation

Electronics - R.C. coupled amplifiers and Oscillators. (LC nd RC) Hartley-Colpitts , phase shift oscillators, calculation of current and voltage gain, Input and output impedance of transistor amplifiers (Both Bipolar and Unipolar : Small signal) . Large signal amplifiers and their analysis. Wave shapping circuits and analysis of time base generators, different types of

multiveibrators and their uses. Digital circuits.

Industrial Electronics - Principles and design of Single phase and three-phase, uncontrolled and controlled rectifiers smoothing filters, Regulated power supplies, Speed control. of drive for D.C., Induction and motors , Inverters, Choppers, different type of switching devices and their characteristics

PAPER - II

SECTION - A

Control systems - Mathematical modelling of dynamic linear control systems , State Variable formulation, Singal flow graphs, Transient response of first and second order systems. Steady state error, stability Hurwitz and Nyquist criterian frequency response techniques , Root locus techniques.

Reliability Engineering- Random variables -Distribution function e.g. Binomianl , Poisson and Normal Distribution functions general reliability fuction MTTF, Markov Process.

SECTION - B

Heavy Currents

Electrical Machines - Induction Machines,Torque -slip characteristics , equivalent circuit circle diagrams , starters, speed control, double cage motor, Induction generator, Phasor diagram Characteristics and application of single phase motors.

Synchronous machines, types of synchronouse machines emf equation, phasor diagram circle diagram; operation - on - infinite bus-bar synchronizing power, operating characteristics and performance for motor and alternator voltage Regulation.

Special machines - Amplidyne and Metadyne, operating characteristics and their application, Addition.

Power system & Protection - Economics of different types of power stations, Tariffs, base load , peak load and pumped storage plants,Economics of different systems of d.c. and a.c. power distribution, transmissioin line parameter calculation, concept of G.M.D. Short medium and long

transmission lines . Insulatore voltage distribution in a string of insulators and grading of insulation Fault calculations by symmetrical components , load flow analysis , and economic operation, Steady state and transient stability cables, design of transmission line.

Switchgear-Methods of arc extinction, restriking and recovery voltage Protective schemes of equipmentsand line protection. Surges, Travelling waves in transmission lines and protection against surges.

Industrial drives-Electric motors for various drives and estimate of their rating, behaviour of motors during starting , braking and reversing operation , schemes of speed control for d.c. and induction motors.

Electric Traction - Speed time curves in practice, calculation of specific energy consumpiton, rating characteristics of traction motors, Dielectirc Heating and Induction Heating.

SECTION - C

Light Currents

Communication systems-Generation and detection of amplitude frequency-phase and pulse-modulated signals using oscillators, modulators and demodulators, Noise, channel efficiency sampling theorem, T.V. transmission and receiving systems, Antennas.

Feeders and receiving circuits, Transmission line at audio, radio and ultra high frequencies.

Microwaves- Wave guides, components , cavity resonators, microwave timers, microwave communication systems RADAR C.C. amplifiers difference amplifiers, choppers and analog computation techniques using opamps Time and amplitude sealing simple function generators.