

SYLLABUS FOR TAMILNADU COMMON ENTRANCE TEST (TANCET)

PART – III

3. ELECTRICAL AND ELECTRONICS ENGINEERING

Electrical Circuits and Fields: KCL, KVL, Nodal & Mesh analysis, transient response of D.C and A.C networks; sinusoidal steady-state analysis; resonance in electrical circuits; concepts of ideal voltage and current sources, network theorems, driving point admittance and transfer functions of two port network, three phase circuits; Fourier series and its application; Gauss theorem, electric field intensity and potential due to point, line plane and spherical charge distribution, dielectric, capacitance calculations for simple configurations; Ampere's and Biot-Savart' law, inductance calculations for simple configurations.

Electrical Machines: Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformer –connections; auto transformer; principles of energy conversion, windings of rotating machines; D.C generators and motors-characteristics, starting and speed control, armature reaction and commutation: three phase induction motors-performance characteristics, starting and speed control; single-phase induction motors; synchronous generators – performance, regulation; synchronous motors – starting characteristics, applications, synchronous condensers; fractional horsepower motors: permanent magnet and stepper motors.

Power Systems: Electric power generation – thermal, hydro, nuclear; transmission line parameters; steady –state performance of overhead transmission lines and cables and surge propagation; distribution system, insulators , bundle conductors, corona and radio interferences effects; per-unit quantities; bus admittance and impedance matrices; load flow; voltage control and power factor correction; economic operation; symmetrical components, analysis of symmetrical and unsymmetrical faults; principle of over current, differential and distance protections; concepts and solid state relays and digital protection; circuit breakers; principles of system stability –swing curves and equal area criterion; HVDC system – Principle of operation, control and design consideration, HVDC circuit breaking; FACTS - Reactive power control, Uncompensated transmission line, Series compensation, SVC, thyristor control, series capacitor, static synchronous compensator, UPFC and applications.

Control Systems: Principles of feedback; transfer function; block diagram; steady –state errors; stability-Routh and Nyquist criteria; Bode plots; compensation; root loci; elementary state variable formulation; state transition matrix and response for Linear time Invariant systems.

Power Electronics and Drives: Semiconductor power devices-diodes, transistors, thyristors, triacs, GTO, MOSFETs and IGBTs-static characteristic and principles of operation; triggering circuits; phase control rectifiers; bridge converters-fully controlled and half controlled; principles of choppers and inverters, basic concepts of adjustable speed dc and ac drives.

Microprocessor and Microcontrollers: Microprocessor : General 8 bit microprocessor Architecture- 8085, 8086 processor – Architecture, Memory, I/O interfacing, Instruction set, Addressing modes, Timing diagram & delays, Machine cycles, Interrupts, counters, Assembly language programming. Microcontrollers: 8 bit microcontroller -8051 architecture, bus configuration, Instruction sets, programming & applications.

Digital Signal Processing: Analog signals - sampling & Aliasing- Discrete time signals & systems – LTI systems – Convolution sum-Difference equation representation-Z Transform & its Inverse – Discrete Fourier series & Fourier transform- Radix 2 FFT – Decimation in me and frequency – Inverse DFT using FFT – Analog Butterworth & Chebyshev filter design –IIR & FIR filter design and Realization.

High Voltage Engineering: Causes of overvoltages and its effects on power system – Lightning, switching surges and temporary overvoltages – concepts of reflections and refraction of travelling waves. Dielectric breakdown- Gaseous breakdown – Vacuum breakdown, Corona discharges – Generation of high voltage, High current and its measurements – DC, AC, impulse voltages and currents; High Resistance with series ammeter – Dividers, Resistance, Capacitance and Mixed dividers – Peak Voltmeter , CVT, Electrostatic Voltmeters – Sphere Gaps – High current shunts; High voltage testing of electrical power apparatus as per International and Indian standards – Insulation Coordination.

Electric energy – Conservation and utilization: Fundamentals of Electric drives – choice and applications; traction motors – characteristic features – electric braking train movement and energy consumption; Design of illumination systems and various lighting schemes; Electric heating – methods of electric heating and its types – Electric welding - Principles of the conversion of solar radiation into heat; Solar Collectors-flat-plate collectors – concentrating collector – cylindrical parabolic; Wind energy conversion system – basic principles – site selection – basic components – Classification of WECS – Types of wind machines.