ANNEXURE-II

PAPER-I (DEGREE STANDARD)

(a) CIVIL ENGINEERING   CODE NO: 261

UNIT I : BUILDING MATERIALS AND CONSTRUCTION PRACTICES

Properties of engineering materials-brick, stones, aggregates, cement (types and grades), concrete (mix design), Concrete admixtures, Self compacting Concrete, steel and new materials. - Construction of stone masonry, brick masonry and R.C.C. and block masonry – construction equipments - Building bye - laws and Development regulations practiced in Tamil Nadu - Provisions for fire safety, lighting and ventilation- Acoustics.

UNIT II : ENGINEERING SURVEY

Survey - computation of areas - Chain Survey - Compass surveying - Plane table survey - levelling - fly levelling - L.S. and C.S. - Contour volumes - Theodolite survey - Traversing - Heights and Distances - Geodetic Observations- Tachometry and Triangulation - Use of EDM, GPS and Remote sensing techniques.

UNIT III : STRENGTH OF MATERIALS

Stresses and strains -Thermal stresses- elastic constants - Beams and bending - Bending moment and shear force in beams - Theory of simple bending - deflection of beams - torsion - Combined stresses – stresses on inclined planes - Principal stresses and principal planes - Theories of Failure – Analysis of plane trusses.

UNIT IV : STRUCTURAL ANALYSIS

Indeterminate beams - Stiffness and flexibility methods of structural analysis - Slope deflection - Moment Distribution method – Arches and suspension cables - Theory of columns - moving loads and influence lines – Matrix method- Stability of retaining walls – plastic theory.

UNIT V : GEOTECHNICAL ENGINEERING

Formation of soils - types of soils - classification of soils for engineering practice - Field identification of soils - Physical properties of soils - Three phase diagram - permeability characteristics of soils - stress distribution in soils - Theory of consolidation, shear strength parameters of soils - Compaction of soils. Soil exploration - Soil sampling techniques - Borelog profile - shallow foundations - Terzhagi's bearing capacity theory - Pile foundation - Group action of piles - settlement of foundations.

UNIT VI : ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water - Ground water Hydraulics - Characteristics of water - Water analysis - water treatment - water borne diseases. Sewerage system - Design of sewerage systems - sewer appurtenances - Pumping of sewage - sewage treatment and disposal - Industrial waste treatment - solid waste management - Air, water and Noise pollution control- e waste management.

UNIT VII : DESIGN OF REINFORCED CONCRETE, PRESTRESSED CONCRETE AND STEEL STRUCTURES

Design of concrete members - limit state and working stress design concepts - design of slabs - one way, two way and flat slabs - Design of singly and doubly reinforced sections and flanged sections -design of columns and footings – pre-stressing - systems and methods- post tensioning slabs - Design of pre-stressed members for flexure.

Design of tension and compression members - Design of Bolted and welded connections design of members of Truss - designs of columns and bases - design of beams, plate girders and gantry girder.

UNIT VIII : HYDRAULICS AND WATER RESOURCES ENGINEERING

Hydrostatics-applications of Bernoulli equation – flow measurement in channels, Applications of Momentum equation, Kinematics of flow.

Water resources in Tamil Nadu - Water resource planning - Master plan for water management flood control –Runoff estimation – hydrograph – flood routing - Soil plant water relationship - Water requirement of crops - Irrigation methods –Design of alluvial canal and design of headworks. Waterlogging and land reclamation - Cross drainage works.

UNIT IX : URBAN AND TRANSPORTATION ENGINEERING

Urbanisation trend and impact - Slum clearance and slum improvement programmes - Different modes of transport and their characteristics. Geometric design of highways. – Design and Construction of bituminous and concrete roads - Maintenance of roads.
Railways-Components of permanent way - Signalling, Interlocking and train control. Airport planning-Components of Airport - Site selection – Runways – Planning of terminal buildings. Harbours & Ports- Layout of a harbour - Docks - Breakwaters.

UNIT X : PROJECT MANAGEMENT AND ESTIMATING

Construction management - Construction planning - Scheduling and monitoring - Cost control, Quality control and inspection - Network analysis - CPM and PERT methods of project management - Resources planning and resource management. Types of estimates - Preparation of technical specifications and tender documents - Building valuation - law relating to contracts and arbitration.

(b) ELECTRICAL ENGINEERING   CODE NO: 259

UNIT – I ELECTRICAL CIRCUITS
Circuit elements – Kirchoff's Laws – Mesh and Nodal Analysis - Network Theorems and Applications for DC and AC circuits: Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem – Sinusoidal Steady State Analysis of RL-RC-RLC Circuits- Resonant Circuits - Natural and Forced Response – Transient Response of RL-RC-RLC Circuits-Two-port networks – Three Phase Circuits.

UNIT – II ELECTRIC AND MAGNETIC FIELDS
Coulomb's Law-Electric Field Intensity-Electric Flux Density-Gauss's Law- Divergence - Electric Field and Potential due to Point, Line, Plane and Spherical Charge Distributions - Effect of Dielectric Medium - Capacitance of Simple Configurations.

Magnetic Circuits- Magnetomotive force - Reluctance-Faraday's laws-Lenz's law--Biot- Savart's law - Ampere's law - Fleming's Left and Right Hand Rule-Lorentz force - Inductance - Self and Mutual Inductance-Dot Convention-Coupled Circuits.

UNIT – III MEASUREMENTS AND INSTRUMENTATION
Units and Standards – Static and Dynamic Characteristics-Types of Errors-Error Analysis – Measurement of Current, Voltage, Power, Power-factor and Energy – Indicating instruments – Measurement of Resistance, Inductance, Capacitance and Frequency – Bridge Measurements – Instrument Transformers-Electronic Measuring Instruments – Multi meters-True RMS meter-Spectrum Analyzer-Power Quality Analyser- Recording Instruments-X-Y Recorder-Magnetic Recorders-Digital Data Recorder-Oscilloscopes-LED and LCD Display-Transducers and their applications to the Measurement of Non-Electrical Quantities like Temperature, Pressure, Flow-rate, Displacement, Acceleration, Noise level — Data Acquisition Systems – A/D and D/A Converters- Data Transmission Systems.

UNIT – IV CONTROL SYSTEMS
Mathematical Modelling of Physical Systems – Transfer Function - Block Diagrams and Signal Flow Graphs and their Reduction using Mason's Rule – Time Domain and Frequency Domain Analysis of Linear Time Invariant (LTI) System – Errors for Different Type of Inputs and Stability Criteria for Feedback Systems – Stability Analysis Using Routh-Hurwitz Array – Nyquist Plot and Bode Plot – Root Locus – Gain and Phase Margin – Basic Concepts of Compensator Design – PI,PD and PID Controllers-State Variable Matrix – System Modeling and Design – Sampled Data System – Stability of Sampled Data System.

UNIT –V ELECTRICAL MACHINES
D.C. Machines – Construction, Excitation methods – Armature Reaction and Commutation – Characteristics and Performance Analysis – Generators and Motors – Starting and Speed Control – Testing – Losses and Efficiency.

Transformers-Types-Construction and Operation- Testing – Equivalent Circuits – Losses and Efficiency-All day efficiency – Regulation – Parallel Operation – Three Phase Transformers – Auto-transformer.

Induction Machines – Construction, Principle of operation – Rotating Magnetic Field – Performance, Torque-Speed Characteristics, No-load and Blocked Rotor tests, Equivalent Circuit, – Starting and Speed Control – Single-Phase Induction Motors – Linear Induction Motors – Hysteresis Motors – Reluctance Motors. Synchronous Machines – Construction – Operating characteristics and Performance analysis – Efficiency and Voltage regulation – Parallel operation – V and inverted V curves of synchronous motors – Power factor improvement-BLDC Motor.

UNIT –VI POWER SYSTEMS
Single Line Diagram of Power System-Per Unit Quantities-Power Generation Types-– Hydro, Thermal and Nuclear Stations – Pumped storage plants – Co generation– Economic and operating factors – Modelling and performance characteristics of Power transmission lines and Cables-HVDC transmission–Mechanical Design of Transmission Lines-Sag-Insulators - Z_{Bus} and Y_{Bus} formulation - Load flow studies –– Shunt and Series Compensation- Symmetrical and Un symmetrical Faults Analysis - Transient and Steady-State Stability of Power Systems – Equal Area Criterion-Voltage and Frequency Control – Power System Transients – Power System Protection – Circuit Breakers – Relays –AC and DC Distribution.

UNIT –VII ANALOG AND DIGITAL ELECTRONICS
Semiconductor Devices – PN junctions – Transistors – FET – Zener,   Photo diodes and their applications – Rectifier circuits – Voltage regulators – Multipliers.
Biasing circuits – Small signal amplifiers – Frequency response – Multistage amplifiers – Coupling methods – Large signal amplifiers – Push-pull amplifiers – Feedback amplifiers – Oscillators – Operational amplifiers and its applications – Precision rectifiers – Multivibrators - Voltage Controlled Oscillator-Timer.

Digital logic gate families (DTL,TTL,ECL,MOS,CMOS) – Logic gates - Simplification of Logic Functions- Design of Combination circuits - Sequential logic circuits-latch–Flip-flops– Counters – Registers – Memories(ROM,PLA and FPGA).

UNIT - VIII POWER ELECTRONICS AND DRIVES
Power Semiconductor devices – Ideal and practical attributes of switch - Power Diode-DIAc - SCRs-TRIAC-GTO - power MOSFET-IGBT- Static Characteristics and Principles of Operation- Single and Three Phase AC to DC Converters   – Single and Three Phase AC to AC converters –DC to DC Converters (MOSFET and IGBT based) - Single and Three Phase Inverters (MOSFET and IGBT based) - Pulse Width Modulation – Sinusoidal Modulation with Uniform Sampling – Uninterrupted Power Supplies-Switched Mode Power Supplies – Speed Control of DC and AC Motor Drives– Applications of Variable Speed Drives.

UNIT –IX DIGITAL PROCESSORS AND COMMUNICATION
Architecture of 8085, 8086 and 8051 – Instruction Sets – Assembly Language Programming – Interfacing for memory and I/O: 8255 Programmable Peripheral Interface – 8253 Programmable Timer Interface – 8279 Programmable Keyboard and Display Interface – 8257 Direct Memory Access Interface - Embedded processors(ARM and PIC basics only).

Classification of Signals – Properties of Discrete Fourier Transforms - FFT Computation – FIR Filters – IIR Filters: Butterworth Filters – Chebyshev Filters.

Digital Communication Systems: Pulse Code Modulation and Demodulation – Adaptive Delta Modulation - Frequency Division and Time Division Multiplexing – Data Communication Network Topologies - 7-layer OSI Protocol.

UNIT –X RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

Renewable Energy – Sources and Features - Solar Radiation Spectrum - Radiation Measurement-Solar Photovoltaic Cell -Operating Principle- Microhydel - Operating principle- Wind Energy Source- Wind Patterns and Wind Data- Site Selection-Types of Wind Generators-Fuel Cells-Batteries-Super Capacitors.

(c) ELECTRONICS AND COMMUNICATION ENGINEERING
(DEGREE STANDARD)

UNIT - I: SEMICONDUCTOR THEORY AND ELECTRONIC DEVICES
Intrinsic and extrinsic semiconductors, Energy Band Diagrams, Diffusion and Drift current densities, Hall effect. PN junction diode, current equation, Transition and Diffusion capacitances, Zener diode, Tunnel diode, Varactor diode, Photo diode, Schottky diode, LED, BJT, FET, JFET, MOSFET, SCR, UJT, TRIAC, IC fabrication.

UNIT - II: CIRCUIT THEORY, SIGNALS AND SYSTEMS
Kirchoff's laws, Nodal and Mesh analysis, Network theorems: Superposition, Thevenin, Norton, Maximum Power Transfer, Miller; Delta-Wye conversion, Transients and resonance in RLC circuits, Magnetically coupled circuits, Mutual inductance.
Continuous and Discrete time signals, Energy and power signals, Fourier series, Fourier transform analysis of continuous time signals and systems, Laplace transform analysis, Convolution integral, DTFT and Z transform analysis of discrete time signals and systems, Convolution sum, Recursive and Non-recursive systems, Sampling Theorem.

UNIT - III: ANALOG ELECTRONIC CIRCUITS
BJT, JFET, MOSFET amplifiers: Biasing analysis, Small signal analysis and frequency response, BJT and MOSFET Multistage amplifiers: Differential, Darlington, cascode and cascade; Feedback amplifiers, Tuned amplifiers, RC and LC oscillators, Power amplifiers. Rectifiers and wave shaping circuits, Operational Amplifier characteristics and applications, CMRR, Slewrate, Waveform generators, Active filters, Timers, PLL, VCO, ADC, DAC, Regulators and Converters.

UNIT - IV: CONTROL SYSTEMS AND INSTRUMENTATION
Control system components, feedback, transfer function, transient and steady analysis of LTI systems, Frequency response, Bode, Polar, Nyquist plots, Routh-Hurwitz and Nyquist stabilities, Lag, Lead, Lag-lead compensation, State variable model.

UNIT – V: ELECTRONIC COMMUNICATION
AM, FM, PM modulation and demodulation, Superheterodyne receiver, AGC, PAM, PWM and PPM, Entropy, Mutual information, Channel capacity, PCM, DPCM, ADPCM, DM, ADM, Source encoding techniques, TDM and FDM, line coding techniques, ASK, FSK, PSK, QPSK, QAM – Bandwidth, SNR, BER, Error Probability, Eye Diagram, Bandpass Sampling, clock and carrier synchronization, Error control coding, Spread spectrum modulation methods.

UNIT – VI: ELECTROMAGNETIC FIELDS AND ANTENNAS
Theorems: Divergence, Stokes, Coulomb; Poisson and Laplace Equation, Ampere's law, Biot-Savort law, Gauss law for magnetic fields, Maxwell's equations, Displacement current, Uniform plane waves, Polarization, reflection and refraction of plane waves at different boundaries, Poynting vector.

Transmission line equation, Characteristic impedance, impedance matchin g, Smith chart, Attenuators and Equalizers, Lattice diagram, TE, TM and Tem waves, Rectangular guides,

Dielectric slab wave guides, TE and TM wave in circular guides, Cavity resonator and Q for dominant mode.

Antennas: Diploe, Horn, Reflector, Slot, spiral, logperiodic microstrip; Broadside and End fire array, adaptive array, antenna gain, radiation pattern, polarization, VSWR, Radiowave propagation.

UNIT – VII: COMMUNICATION SYSTEMS

Wireless Link budget, Wireless channel characteristics: coherence bandwidth, Doppler spread; Flat, Frequency selective, Fast and slow fading; FDMA, TDMA, CDMA, Capacity calculation, Frequency reuse, Channel assignment, Handoff, trunking and grade of service. Minimum shift keying Gaussian Minimum shift keying, OFDM, cyclic prefix, PAPR, Adaptive equalization, Diversity, Rake receiver, MIMO Systems, Beam forming, Capacity in fading and non-fading channels.

Microwave signal generation: Klysttron, Magnetron, TWT, GUNN Diode, IMPATT, TRAPATT; Devices: Directional Coupler, T Junctions, Isolator, Circulator, Couplers, Irisis, Probes. Microwave transistors – Stability analysis, Microwave measurements – power, VSWR, Frequency, Dielectric constant.

Light Propagation in optical fibres, Ray and mode theory, Fibre structure, Fibre materials, merits of optical fibre communication, Fibre attenuation and dispersion characteristics, Materials for optical sources, LED and LASER Diodes, Optical detection, PIN and Avalanche Photo diodes, WDM Concept, optical networks.

Satellite orbits – Kepler's laws, Geostationary satellite, transponders, GPS receiver DBS/DTH.

OSI/TCP/IP model - functions and protocols of layers, Routing algorithms, Congestion control algorithms, MAC Protocols.

UNIT – VIII: DIGITAL SIGNAL AND IMAGE PROCESSING

DFT, FFT, Overlap and save methods, Butterworth and chebyshev filters, impulse invariant and bilinear transform methods, realization structures, FIR design methods, product quantization, limit cycle oscillations, scaling, Decimation and interpolation, multirate signal processing.

Brightness, Contrast, Hue, Saturation, RGB, HSI Models, Mach band Effect, Image sampling, DCT, Histogram Equilzation, Mean and median filters, Region growing segmentation, JPEG standard.

UNIT – IX: VLSI AND EMBEDDED SYSTEMS

CMOS inverter, Combinational logic circuits, Elmore's Constant, Pass transistor logic, Power dissipation, static and dynamic registers. Clock strategies, synchronous and Asynchronous Circuits, Adders and multipliers, PLA, PAL, FPGA. Architecture and instruction set of 8085, 8086 and 8051, assembly language programming. Microprocessor based systems. ARM processor family – architecture, Multiple tasks, multiprocesses and multiprocessors. Scheduling, power optimization strategies, I2C, CAN bus.

UNIT – X: COMPUTER ENGINEERING

Number systems, Boolean algebra, Karnaugh map, logic gates, Adders, magnitude comparator, Decoder, Encoder, Mux, Demux, Fliplops, Counters, shift register, Synchronous sequential circuits, Asynchronous sequential circuits, ROM, EPROM, EEPROM.

Fundamentals of Computer architecture, Data path and control unit design, RAM, Optical, Cache and Virtual Memories, Memory allocation, Associative memory, DMA, interrupts, RISC and CISC processors.

PAPER-II

GENERAL STUDIES (DEGREE STANDARD/OBJECTIVE TYPE)

(Code No: 003)

UNIT-I: GENERAL SCIENCE

Physics Universe-General Scientific laws-Scientific instruments-Inventions and discoveries-National scientific laboratories-Science glossary-Mechanics and properties of matter-Physical quantities, standards and units-Force, motion and energy-Electricity and Magnetism, Electronics and Communication -Heat, light and sound-Atomic and nuclear physics-Solid State Physics – Spectroscopy- Geophysics - Astronomy and space science.

Chemistry Elements and Compounds-Acids, bases and salts-Oxidation and reduction-Chemistry of ores and metals-Carbon, nitrogen and their compounds-Fertilizers, pesticides, insecticides-Biochemistry and biotechnology-Electrochemistry-Polymers and plastics.

Botany Main Concepts of life science-The cell-basic unit of life-Classification of living organism-Nutrition and dietetics-Respiration-Excretion of metabolic waste-Bio-communication.

Zoology Blood and blood circulation-Endocrine system-Reproductive system-Genetics the science of heredity-Environment, ecology, health and hygiene, Bio- diversity and its conservation-Human diseases-Communicable diseases and non- communicable diseases- prevention and remedies- Alcoholism and drug abuse-Animals, plants and human life

UNIT- II: CURRENT EVENTS

History Latest diary of events – National--National symbols-Profile of States-Defence, national security and terrorism-World organizations-pacts and summits-Eminent persons & places in news-Sports & games-Books & authors -Awards & honours-Cultural panorama-Latest historical events - India and its neighbours - Latest terminology- Appointments-who is who?

Political Science 1. India's foreign policy 2. Latest court verdicts – public opinion 3. Problems in conduct of public elections 4. Political parties and political system in India 5. Public awareness & General administration 6. Role of Voluntary organizations & Govt., 7. Welfare oriented govt. schemes, their utility

Geography Geographical landmarks-Policy on environment and ecology.

Economics Current socio-economic problems-New economic policy & govt. sector.

Science Latest inventions on science & technology-Latest discoveries in Health Science-Mass media & communication.

UNIT-III : GEOGRAPHY

Earth and Universe - Solar system-Atmosphere hydrosphere, lithosphere - Monsoon, rainfall, weather and climate - Water resources - rivers in India-Soil, minerals & natural

resources - Natural vegetation - Forest & wildlife-Agricultural pattern, livestock & fisheries - Transport including Surface transport & communication - Social geography – population - density and distribution-Natural calamities – disaster management-Climate change - impact and consequences - mitigation measures - Pollution Control.

UNIT-IV: HISTORY AND CULTURE OF INDIA

Pre-historic events -Indus valley civilization-Vedic, Aryan and Sangam age-Maurya dynasty-Buddhism and Jainism-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the bahmanis-South Indian history - Culture and Heritage of Tamil people-Advent of European invasion-Expansion and consolidation of British rule - Effect of British rule on socio-economic factors-Social reforms and religious movements - India since independence-Characteristics of Indian culture-Unity in diversity – race, colour, language, custom-India-as secular state-Organizations for fine arts, dance, drama, music-Growth of rationalist, Dravidian movement in TN-Political parties and populist schemes-Prominent personalities in the various spheres – Arts, Science, literature and Philosophy – Mother Teresa, Swami Vivekananda, Pandit Ravishankar , M.S.Subbulakshmi, Rukmani Arundel and J.Krishnamoorthy etc.

UNIT-V: L INDIAN POLITY

Constitution of India - Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-rights amend duties- Fundamental rights- Fundamental duties- Human rights charter- Union legislature – Parliament- State executive- State Legislature – assembly- Status of Jammu & Kashmir- Local government – panchayat raj – Tamil Nadu- Judiciary in India – Rule of law/Due process of law- Indian federalism – center – state relations-. Emergency provisions- Civil services in India- Administrative challenges in a welfare state- Complexities of district administration- Elections - Election Commission Union and State. Official language and Schedule-VIII- Amendments to constitution- Schedules to constitution-. Administrative reforms & tribunals- Corruption in public life- Anti-corruption measures – Central Vigilance Commission, lok-adalats, Ombudsman, - Comptroller and Auditor General of India- Right to information - Central and State Commission- Empowerment of women- Voluntary organizations and public grievances Redressal- Consumer protection forms.

UNIT- VI: INDIAN ECONOMY

Nature of Indian economy-Need for economic planning-Five-year plan models-an assessment-Land reforms & agriculture-Application of science in agriculture Industrial growth-Capital formation and investment-Role of public sector & disinvestment-Development of infrastructure- National income- Public finance & fiscal policy- Price policy & public distribution- Banking, money & monetary policy- Role of Foreign Direct Investment (FDI)- WTO-globalization & privatization- Rural welfare oriented programmes-Social sector problems – population, education, health, employment, poverty-HRD – sustainable economic growth- Economic trends in Tamil Nadu -Energy Different sources and development- Finance Commission -Planning Commission- National Development Council.

UNIT-VII: INDIAN NATIONAL MOVEMENT

National renaissance-Early uprising against British rule-1857 Revolt- Indian National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji -Growth of