ANNEXURE- I
[SYLLABUS FOR WRITTEN EXAMINATION]
Paper–I
CIVIL ENGINEERING
(Degree Standard)

CODE NO: 101

UNIT-I: BUILDING MATERIALS AND CONSTRUCTION PRACTICES

Properties and testing of engineering materials-brick, stones, M-sand, aggregates, cement, timber, recycled and modern materials-glass, plastic FRP, ceramic- concrete – properties and testing-mix design-admixtures, Self- compacting concrete steel construction practice-stonemasonry, brickmasonry, R.C.C. and block masonry – construction equipment - building bye-lawsand development regulations practiced in Tamil Nadu - Provisions for fire safety, lighting and ventilation-Acoustics.

UNIT- II: ENGINEERING SURVEY

Survey -Chain- Compass - Plane table - levelling –Theodolite - computation of area and volume - L.S. and C.S. – Contour - Traversing – traverse adjustment-Heights and Distances - Tacheometry and Triangulation - total station and GPS and Remote sensing techniques for surveying.

UNIT III: ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

Forces- types-laws - centre of gravity-moment of inertia-friction-Stresses and strains -Thermal stress- elastic constants - Beams - 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- Seismic analysis of high rise building

UNIT- V: GEO TECHNICAL ENGINEERING

Formation of soils - types of soils - classification of soils for engineering practice - Field identification of soils - Physical properties and testing of soils - Three phase diagram - permeability characteristics of soils - stress distribution in soils - Theory of consolidation, shear strength parameters of soils – stabilization of soil - Compaction of soils- Stability analysis of slope - Soil exploration - Soil sampling techniques – SPT – Borelog profile - shallow foundations - Terzhagi's bearing capacity theory - Pile foundation–pile load test- Group action of piles - settlement of foundations- Ground Improvement techniques.

UNIT- VI: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water - Water Demand Characteristics and analysis of water – hydraulics for conveyance and transmission - water borne diseases – Functional design of water treatment plant – desalination plant- water distribution system – pipe

network analysis- characteristics and composition of sewage - Planning and design of sewerage system - sewer appurtenances – Pumping of sewage - sewage treatment and disposal – Design of storm water drain - plumbing system in high rise building – industrial waste treatment - solid waste management – Air 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 anddoubly 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- design of liquid storage structures – elevated and underground - design of retaining wall.

UNIT-VIII : HYDRAULICS AND WATER RESOURCES ENGINEERING

Hydrostatics - applications of Bernoulli equation – losses in pipes - flow measurement in channels - open channel flow- types of pumps and characteristics - 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 for crops - Irrigation methods– Design of alluvial canal and design of head works. Water logging and land reclamation - cross drainage works.

UNIT - IX: URBAN AND TRANSPORTATION ENGINEERING

Urbanization trend and impact - Slum clearance and slum improvement programmes – Different mode of transport and their characteristics. Geometric design of highways. Pavement materials and testing – alternate pavement materials-modified binders - Design and Construction of bituminous and concrete roads – pavement distress and evaluation - Maintenance of roads – Railways - Components of permanent way - Signaling, Interlocking and train control - drainage in roads and railways. 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 ESTIMATION

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 – e-tender - Building valuation - law relating to contracts and arbitration.

Paper-I

MECHANICAL ENGINEERING

(Degree Standard)

CODE NO: 102

UNIT–I : MECHANICS, KINETICS AND DYNAMICS

Statics of Particles, Equilibrium of Rigid bodies, Mechanism of Deformable Bodies, Properties of Surfaces and Solids, Centroid, Centre of Gravity, Dynamics of Particles, Elements of Rigid Body Dynamics, Basics of Mechanisms, Kinematics of mechanisms, gyroscope, Gears and Gear Trains, Fly Wheels and Governors, Balancing of Rotating and Reciprocating Masses, Friction in Machine Elements, Force Analysis, Balancing, Single Degree Free Vibration, Forced Vibration, mechanisms for Vibration Control, Effect of Damping, Vibration Isolation, Resonance, Critical Speed of Shaft.

UNIT–II: STRENGTH OF MATERIALS AND DESIGN

Stress, Strain and Deformation of Solids, Combined Stresses, Theories of Failures, Transverse Loading on Beams, Stresses in Beams, Torsion, Deflection of Beams, Energy Principles, Thin Cylinders and Thick Cylinders, Spherical Shells, Fundamentals of Design for Strength and Stiffness of Machine Members, Design of Shafts and Couplings, Design for Static and Dynamic Loading, Design of Fasteners and Welded Joints, Reverted Joints, Design of Springs, Design of Bearings, Design of Flywheels, Design of Transmission Systems for Flexible Elements, Spur Gears and Parallel Axis Helical Gears, Bevel Gears, Worm Gears and Crossed Helical Gears, Design of single and two stage speed reducers, Design of cam, Clutches and Brakes, Design of Piston and Connecting Rods.

UNIT-III: FLUID MECHANICS AND TURBO MACHINERY

Fluid properties, fluid statics, manometry, buoyancy, control volume analysis of mass, momentum and energy, fluid acceleration, differential equations of continuity and momentum, Bernoulli's equation, Dimensional Analysis,viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends. Turbo machinery: Pelton wheel, Francis and Kaplan turbines - impulse and reaction principles – velocity diagrams, pumps and its applications-Valves and Types - Theory of Jet Propulsion- Pulse Jet – Ram Jet Engines, Online Continuous Flow Monitoring System.

UNIT–IV: THERMAL ENGINEERING AND THERMODYNAMICS

Basic concepts, Zeroth, First and Second laws of thermodynamics, thermodynamic system and processes, Carnot cycle. Irreversibility and availability, behaviour of ideal and real gases, thermodynamic relations, properties of pure substances, calculation of work and heat in ideal processes, analysis of thermodynamic cycles related to energy conversion, Fuel and combustion, Fuels Characteristics, Emissions and Controls, Testing of IC Engine-Renewable sources of Energy.Power Engineering: Steam Tables, Rankine, Brayton cycles with

regeneration and reheat. I.C. Engines: air-standard Otto, Diesel cycles. Refrigeration andair-conditioning: Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle; moist air: psychometric chart, basic psychometric processes.

UNIT–V: HEAT AND MASS TRANSFER

Modes of heat transfer - one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer in flow over flat plates and through pipes, thermal boundary layer, effect of turbulence, radiative heat transfer, black and grey surfaces, shape factors, network analysis; heat exchanger performance, LMTD and NTU methods.

Basic Concepts of Mass transfer, Diffusion Mass Transfer, Fick's Law of Diffusion Steady state Molecular diffusion, Convective Mass Transfer, Momentum, Heat and Mass Transfer Analogy, Convective Mass Transfer Correlations, Radioactive Heat Transfer.

UNIT–VI: MATERIALS SCIENCE AND METALLURGY

Constitution of alloys and phase diagrams, Iron–Iron Carbide Phase Diagram - steels, cast iron, phase trans formations – diffusion - TTT diagram, ferrous and nonferrous alloys, heat treatment of ferrous and non-ferrous metal, surface modification techniques, powder metallurgy, non-metallic materials, mechanical properties and testing, crystal defects and strengthening mechanisms, conducting and semi conducting materials, magnetic and dielectric materials, Engineering ceramics, Engineering and commodity polymers, composites, nano-materials.

UNIT–VII: PRODUCTION TECHNOLOGY

Foundry Technology- types of pattern, cores, moulding and casting methods, Solidification, design of castings, defects, Melting Furnaces, Hot and Cold working, Metal Forming Processes - types, Defects and Remedies, Sheet Metal Operation, metal joining processes, types and design of weldment, welding metallurgy, welding defects, Casting, Welding Inspection (NDT), Manufacturing of Thermo Setting and Thermo Plastic Products, Metal cutting, Cutting Tool Nomenclature, Machinability machine tools - center lathe, drilling, milling, grinding, gear cutting and broaching, Machining Time Calculation, unconventional machining processes, Micro Manufacturing, CNC machine tools, Manual Part Programming - Machining and Turning Centre.

UNIT–VIII: METROLOGY AND QUALITY CONTROL

Limits, Fits and Tolerance, Linear and angular measurements, Interferometry, laser interferometers - Types, Computer Aided Inspection, Basic concept of CMM - Types of CMM, Machine vision, Form measurement – Straightness - Flatness, Roundness, Surface finish measurement, contact and non-contact method, Measurement of power, flow and temperature. Statistical quality control, control charts, acceptance sampling, reliability, TQM, 5S, ISO standards.

UNIT-IX: CAD/ CAM/CIM/FEA

Fundamentals of Computer Graphics, Geometric Modelling, Visual Realism, Assembly of Parts, CAD Standards, Fundamentals of CIM, Production Planning and Control, Computer Aided Process Planning, Cellular Manufacturing, Flexible Manufacturing System and Automated Guided Vehicle System, Group Technology, Production Flow Analysis, Industrial Robotics, Additive Manufacturing, Just in Time(JIT), lean manufacturing, One Dimensional Problems in FEA, Two Dimensional Scalar Variable Problems, Two dimensional vector variable problems, Isometric Parametric Formulation.

UNIT–X: INDUSTRIAL ENGINEERING AND MANAGEMENT

Workstudy-Techniques, Method study and work measurements - objectives-basic procedure, machine loading and scheduling, product sequencing, inventory control - EOQ - quantity discounts, ABC Analysis material handling systems, operations research, Linear Programming, simplex method, Transportation model,Assignment model CPM and PERT, Queuing Models. Management theory and practice, planning - Decision making, Organizing, staffing, Motivation, Leadership, controlling, control techniques, Industrial Safety - Standards – OSHA.

Paper-I

ELECTRICAL ENGINEERING

(Degree Standard)

CODE NO:-103

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-Star-delta transformation-real and reactive power-power factor.

UNIT – II: ELECTRIC AND MAGNETIC FIELDS

Coulomb's Law-Electric Field Intensity-Electric Flux Density-Gauss's Law-Divergence – Electric Field and Potentialdue 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 Analyzer- Recording Instruments-X-Y Recorder-Magnetic Recorders-Digital Data Recorder-Oscilloscopes-DSO-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-PLC –smart meters.

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 formulation- state transition matrix- Eigen values and Eigen vectors-free and forced responses of Time Invariant systems-controllability and observability.

UNIT –V: ELECTRICAL MACHINES

D.C. Machines – Construction, Excitation methods – Armature Reaction and Commutation – Characteristics and Performance Analysis – Generators and Motors– Starting, Speed Control and braking – 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, Speed Control and braking – 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- permanent magnet synchronous motor-Permanent magnet brushless DC motor – stepper 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, classification of protection schemes-overcurrent, distance, differential and carrier-Equipment protection-transformer, generator, motor, busbars and transmission line –AC and DC Distribution-deregulation-energy conservation and energy auditing.

UNIT –VII: ANALOG AND DIGITAL ELECTRONICS

Semi conductor 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 Combinational circuits - Sequential logic circuits-latch– Flipflops– Counters – Registers – multiplexers and demultiplexers- Schmitt triggers-Memories (ROM, PLA and FPGA).

UNIT – VIII: POWER ELECTRONICS AND DRIVES

Principle of Operation and Static and dynamic behaviour of Power Semi conductor devices – Power Diode, DIAC, SCR, TRIAC, GTO, MOSFET and IGBT-

Single and Three Phase AC to DC Converters –uncontrolled and controlled rectifiers- performance parameters– Single and Three Phase AC to AC converters – Switched Mode Power Supplies–buck, boost and buck-boost converter topologies - switching losses-Inverters - Single and Three Phase Inverters – Voltage control-Pulse Width Modulation techniques - harmonic elimination techniques – Uninterrupted Power Supplies- Electrical drives-motor load dynamics-load torque characteristics - Speed Control of DC Drives– Converter / Chopper fed DC motor drives- Speed control of AC drives- induction motor drives –stator voltage control and V/f control-synchronous motor drives-V/f control, self control, margin angle control and power factor control.

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 and systems–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 - IoT concepts.

UNIT –X: RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

Renewable Energy – Sources and Features - Solar Radiation Spectrum-Radiation Measurement - Solar Photovoltaic Cell – principle of operation - types-MPPT – Microhydel - Operating principle - Wind Energy – components - wind power turbine types - MPPT- Site Selection - Types of Wind Generators – smartgrid - Electric vehicles -V2G and G2V- Fuel Cells- Batteries - types and characteristics-Super Capacitors.

Paper-I

TOWN PLANNING

(Degree Standard)

CODE NO:104

UNIT– I: INTRODUCTION TO PLANNING – SCOPE AND CONTENT

Planning System in India, Introduction to Master Plan, Structure Plan, Detailed Development Plans, City Corporate Plan and Smart City Plan. New Town concepts, case studies in India & U.K. – Concept of Region, Types of Region, Regionalization – Evolution of Regional Planning. Institutional framework for Regional Planning – Regional disparities, Resources in Regional development. Multi-level Planning – Regional Planning in India, Regional Plan case Studies, USA, U.K., Japan.

UNIT–II: PLANNING THEORY AND TECHNIQUES

Process of evolution of human settlement planning - Principles in Planning – Rationality in Planning, Blueprint and Process mode, Disjointed Incremental mode of Planning, Normative versus Functional mode of Planning – Type of planning surveys, data identification for various plan preparation. Delphi, Trade off-game, Simulation models, Gravity analysis, Lowry model, Threshold analysis, Multivariate analysis – Optimization and economic analysis methods in project formulation and implementation, PBBS – URDPFI Guidelines.

UNIT–III: URBAN SOCIOLOGY, ECONOMICS, GEOGRAPHY: THEORIES AND APPLICATIONS

Socio-economic groups, structures and Institutions as related to urban and rural communities - Ecological processes and structures in Indian Cities - Social Change & Economic Development - Agglomeration economics - Economics of scale, Multiplier effect concept, scope, limitation - Basic and non-basic activities of economics base, methods of base identification - Land-use determinants, Locational Dynamics of urban Land-use - Spatial organization of Urban settlements - City-region, Urban Sprawl and Fringe - Urbanization in India and Tamil Nadu with reference to settlements and population distribution.

UNIT–IV: ENVIRONMENTAL ISSUES RELATED TO PLANNING

Components of Environment – Classification of Environmental Resources - Purpose and Objectives in Environmental Protection - Institutional and Legal Support in management of the Environment – Environmental Policies, and issues - Environmental Impact Assessment Practice in India - Types, Conceptual Approach and Phases of EIA – Impact Identification - Public Participation in the Process of Environmental Decision Making Process – Environmental Concepts – Sustainable Planning – Eco Cities, Compact Cities, Smart growth.

UNIT–V: URBAN INFRASTRUCTURE NETWORK PLANNING ISSUES

Obligatory and Discretionary Services, Implication of Urban Form and Size on Services, Norms and Standards, National Building Code, 2016. National and Local guidelines – Demand Strategy, Issues and Tasks, Operation and Management Aspects of each Service - Water Supply, Sewerage / Drainage, Solid Waste Management, Roads and Street Lighting - Priority, Placement Network Options, Effective System Analysis – Private and Public partnership and innovative concepts and practices in Infrastructure Development.

UNIT–VI: PROJECT FORMULATION AND IMPLEMENTATION

Types of Project, Project Cycle, Identification, Selection, Preparation - Capital Investment Programme, Internal Rate of Return, Net present Value – Cost Benefit & Analysis, Social Cost Benefit analysis, Budgeting, Tender procedures - Appraisal techniques – Project Proposal and objectives, Current base line conditions, Financial and Economical Appraisal, Socio cultural assessment - Process Monitoring – Key issues, Monitoring Schedule, Data collection, Design, strategy, CPM, PERT - Framework, Impact Evaluation – Approaches, Key issues, Alternative to large scale qualitative Evaluation designs.

UNIT–VII: PLANNING LEGISLATION AND LEGAL FRAME WORK

The concept of law, Indian Constitution. Rights of Ownership and development of property. Statutory control as a positive tool in plan preparation and implementation - Evolution, scope and Significance of Planning Legislation. History and survey of development of planning legislation in India - Panchayat Act, Municipality Act, Corporation Act, TNULB Act, Land Acquisition, Rehabilitation and Resettlement Act, 2013. Provisions in the above acts related to functions, powers, role and responsibilities of local bodies including elected representatives and officers- 73rd and 74th CAA and their implications on planning and development. Local Body finance, revenue, expenditure and resource mobilization - T & C Planning Act of Tamil Nadu 1971, Urban Development Act - Implications of Land ceiling, betterment levy and development charges. Concept of arbitration. The Tamil Nadu Real Estate (Regulation and Development) Act, 2016.

UNIT–VIII: ISSUES IN TRAFFIC AND TRANSPORTATION PLANNING

Highway classification - Traffic characteristics – Horizontal and Vertical alignment, Land use & Transportation relationships - Sight distance – Cross sectional elements– at grade and Grade separated intersections - Volume Count – Origin and Destination – Parking and Public Transport - Surveys – Inventory of Transport facilities – Methods of Survey – Different modes – Capacities–Limitations– Planning Aspects - Coordination – Para Transit modes – Private transport – Urban Transportation Planning Process – Trip Generation – Trip Distribution – Modal Split – Trip Assignment, Transit Oriented Development, Bus Rapid Transit System.

UNIT–IX: REMOTE SENSING AND G.I.S., IN PLANNING

Basics of Remote Sensing and GIS. - Classification of spatial and non-spatial data application of spatial data in urban and regional planning - Identification of required spatial data layers, Applications of GPS – Coding schemes – digitization of spatial data – editing spatial data usable for the given planning problem – Land use Suitability Analysis, Land use Modeling, Existing Land use Preparation using Mobiles, Use of Satellites, Aerial Photographs, Drones in Physical Planning.

UNIT–X: CURRENT TRENDS AND ISSUES IN PLANNING

Concepts of sustainable urban development, sustainable Transportation, E – Governance – City Development Plans - Business Plans, JNNURM, AMRUT, National Rural Health Mission, Public private partnership, local bodies and urban finance. Land Pooling concept, Transfer of Development Right, Accommodation Reservation, Formulation of Re-development and Urban Expansion Plans - Local Area Plans, Town Planning Schemes - Special Economic Zone, Value Capture Finance Policy Framework – Swiss Challenge Model.

Paper-I

ARCHITECTURE

(Degree Standard)

CODE NO: 105

UNIT–I: THEORY OF ARCHITECTURE

- Definition of Architecture, an integration of aesthetics and function
- Elements of Architecture–Form, Space, light, colour, etc.
- Principles of Architecture – Proportion, Scale, balance, rhythm, symmetry, hierarchy, pattern and axis.
- Functional aspects of architecture – site, structure, skin, circulation etc.
- Concepts in Architectural Design
- Understanding the meaning of character & style of buildings with examples
- Design Communication & Graphics

UNIT–II: HISTORY OF ARCHITECTURE & CULTURE

- Egyptian, West Asian, Greek & Roman Architecture – factors influencing the styles, understanding the architectural character with examples
- Buddhist Architecture
- Evolution of Hindu Temple and Architectural contributions of Dravidian, Pallava, Chola, Pandya and Indo-Aryan Periods – Outstanding examples of these periods.
- Development of Indo-Islamic Architecture – Delhi Sultanate, Provincial & Mughal styles
- Modern Architecture – various philosophies & schools of thought in Europe, three generations of modern architects & their contributions
- CIAM, TEAM X, Post Modern Architecture, Deconstruction, High-Tech Architecture, Critical Regionalism
- Architecture of India under Colonial rule
- Post independent architecture of India
- Contemporary World Architecture & Parametric Design

UNIT–III: MATERIALS AND CONSTRUCTION TECHNIQUES

Properties, characteristics, strengths, manufacturing, components & Applications of materials & methods of construction & detailing for the following– Stone – Brick & Clay Products – Lime – Cement – Mortar – Timber – Concrete– Ferrous and Non-Ferrous Metals – Glass – Plastics–Asphalt, Sealants & Adhesives– Protective and Decorative Coatings – Surface finishing & flooring materials - Water Proofing and Damps Proofing Materials – Rural Building Materials (Bamboo, Soil, etc.)

UNIT IV: BUILDING SYSTEMS AND SERVICES CURRENT DEVELOPMENT & NEW TRENDS

Water Supply & Plumbing – Sources, treatment & distribution systems Sources of water, Quality of water & treatment methods, water requirements for different building typologies, Distribution of water – Choice of pipe materials, fittings

& fixtures, Systems of plumbing in all types of buildings Types of pumps – Reciprocating, centrifugal, deep well, submersible automatic pumps, sewerage pump, compressors vacuum pump.

- Waste water & Sewage Disposal
- Primary & Secondary treatments–Modern types of sewage treatment plants – Sewer line fixtures, traps, manholes & septic tanks.
- Solid Waste – collection, treatment, disposal & modern drainage systems – Incinerator, Composting, Vermi composting, Sanitary Land fill, Bio-gas system & modern renewable energy systems, Modern plumbing systems – Selection of pumps & construction of pump rooms.
- Electrical & Electronic Systems
- Electrical installations in buildings – transformers, switch gears, sub stations Single / Three phase supply - Types of earthing for safety, Conduits laying, Bus way & Bus bars, Main and distribution boards - Types of wires, wiring systems and their choice, Planning electrical wiring for building, Communication & data systems – communication spaces, pathways, cabling systems, voice & data, communication, electronic security systems, computer labs / server rooms, etc.
- Lighting Design – Installation & Application in buildings.
- Air conditioning – Systems & Applications
- Window, Split & Packaged Units, Centralized a/c system – A/c plants, DX system, Chilled water system, Air cooled & water cooled condensers, Air distribution systems – VAV & VRV systems, Cooling towers, Fan coil units, circulation pumps, trenches & ducting – configuration, sizing & space requirements.
- Vertical Movement systems – Elevators, Escalators & moving walkways – design criteria & Installation.
- Fire safety – Fire detection system, Fire alarm system, Fire fighting systems, Dry and wet risers, Automatic Sprinklers, Smoke detectors, NBC guidelines.
- Acoustics – Fundamentals, Building design & construction measures for good hearing & sound reinforcement & surface treatment for interiors.

UNIT–V: HUMAN SETTLEMENTS PLANNING

- Origin of Human settlements In India & the rest of the world – River valley civilizations (Indus Valley, Mesopotamia, Egyptian & Chinese) – Traditional planning principles in India – Vernacular architecture of India – approaches & concepts – Classical & Medieval planning in Europe - Evolution of modern planning concepts – Garden city concept, Neighbourhood concept, Geddesian triad, etc.
- Elements of Human settlements – functions & linkages, Structure & form
- Urban Planning & Renewal – Master planning, Zoning regulations, SEZ, PUD, Urban Renewal Plan, Redevelopment, Rehabilitation & Conservation, JNNURM.
- DCR, CRZ for coastal areas
- Issues in contemporary Urban planning

UNIT–VI : URBAN STUDIES – Urban Design, Urban Housing & Conservation

- Urban Design – need, aspects, scope & components of urban space – Historic urban form of Greek, Roman, Mediaeval, Renaissance & Modern & post-modern periods - Indian Urbanism – temple towns, Mughal city form, medieval cities, colonial urbanism, planned capital cities - Theorising & Reading urban space – Image ability & townscape elements, genius loci, collective memory, historic reading of the city & its artefacts by Rossi, social aspects of urban space, gender & class, contribution of Jane Jacobs, William Whyte - Issues of Urban space – URDPFI.
- Housing issues in the Indian Context, Socio-Economic aspects, Housing Standards, Site Planning & Housing Design, Housing Process.
- Conservation – Understanding the need & purpose, definition, Adaptive reuse, International agencies & their role in conservation–Conservation In India – Role of ASI & INTACH – policies & legislations, case studies – craft issues – Conservation practice – listing, documenting, assessing architectural character, structure report & developing guidelines – Urban Conservation – Conservation Planning – TDR, Heritage tourism.

UNIT–VII: ENVIRONMENTAL STUDIES, SITE PLANNING & LANDSCAPE ECOLOGY

- Environment, Ecosystems & bio-diversity – Environmental Pollution, Human population & social issues with relation to the environment – Environmental laws in India.
- Site Planning – Introduction to basic terminologies, Methods of surveying, Instruments & Application, Levelling, Site Drawings, Importance of Site Analysis – On-site & off-site factors, Study of micro climate, Site Diagramming, Site Context, Site planning & Site layout principles.
- Introduction to Landscape Architecture – Elements of Landscape Design – plant material, water & landforms, Garden Design – Japanese, Italian Renaissance & Mughal, Site Planning – Organisation of spaces – circulation, built form and open spaces, site planning and micro climate, site planning for neighbourhood parks, children's play area and campus development – Landscaping of Functional areas – Urban open spaces and principle of urban landscape – Street landscaping, landscape design for waterfront areas and functional areas in urban centers – green roofs and walls.

UNIT–VIII : CLIMATIC DESIGN & ENERGY EFFICIENT ARCHITECTURE

- Climate & Human comfort, Solar Control, Heat flow through materials & building envelope design, Air movement patterns through natural & built forms, Design strategies for different climate types.
- Energy Efficiency – Importance & Significance, Passive Heating & Cooling techniques, case studies, day Lighting & Natural ventilation, Use of Renewable energy systems – Current & future trends.

UNIT–IX: CONSTRUCTION TECHNOLOGY & PROJECT MANAGEMENT

- Construction systems & Practice – Construction methods & equipments, Construction Technology for High-rise buildings, Construction management.
- Project Management – Introduction, Project programming & Critical path method, Cost model analysis, Programming evaluation review technique – PERT network – Computerized Project Management.

UNIT–X: PROFESSIONAL ETHICS & TOOLS FOR PRACTICE

- Architectural profession – Code of conduct & ethics, role of COA & IIA – Architect's Services, Scale of fees, Architectural Competitions - Tender & Contracts – Legal aspects – Important Legislations & current trends.
- Specification – necessity, importance, types & classification – Specification writing - Estimation (Approximate & detailed) – Current trends.
- Drawing & visualization tools – image editing, 2D & 3D modelling, 3D visualization – Photoshop – AutoCad 2000 - Revit - 3D MAX - Sketch up

Paper-I

PUBLIC HEALTH AND SANITATION

(Degree Standard)

CODE NO:110

Unit–I: Chemistry

- Pesticide Chemistry – Composition & reaction of various pesticides. Applied Chemistry – Manufacture of soap, oils, detergents, food products, Adulteration of Consumables.
- Chemical & Physical Properties of Water, pH, treatment methods – hard water – heavy water, Chemicals used for water treatment.
- Chemical formula, Composition of lime & bleaching powder & their reactions.Spot test reagents and tests with them – Cupferron, DMG, thiourea, magneson, alizarin and Nessler reagent.
- Application of coordination compounds – Estimation of nickel using DMG and aluminium using oxine. Estimation of hardness of water using EDTA. Biologically important coordination compounds – Chlorophyll, hemoglobin, vitamin – B12. (their structure and applications). Metal Carbonyls: Mono and Poly nuclear Carbonyls of Ni, Fe, Cr, Co and Mn-Synthesis, structures and bonding.
- Green Catalysis – Heterogeneous – use of zeolites, silica, alumina, supported catalysis – bio catalysis: Enzymes, microbes, phase transfer catalysis (miscellar/surfactant).
- Analytical Chemistry – Data Analysis – Theory of errors – idea of significant figures and its importance with examples – Precision – accuracy – methods of expressing accuracy – error analysis – minimizing errors methods of expresssing precision – average deviation – standard deviation and confidence limit.Purification of solid compounds – extraction – use of immiscible solvents.Chromatography Techniques – Principles – adsorption, partition and ion exchange chromatography, column chromatography – adsorbents – preparation of column – elution, recovery of substance and applications. TLC – choice of adsorbent and solvent – preparation of chromatogram (R_f value) and applications – Paper chromatography – Solvents used – factors affecting R_f value – separation of amino acid mixtures.
- Radioacitivity – Radioactive Emanations, Alpha rays, Beta rays and Gamma rays. The Disintegration theory – Group Displacement Law. Rate of disintegration and Half-life period. Radioactive disintegration series. The Gieger – Nuttal rule – Artificial radioactivity. Induced radioactivity.

Unit–II: Zoology

- Human Physiology – Function of Digestion, Circulation, Respiration, Excretion and Nervous system - Metabolism.
- Ecology – Ecosystem, Food Chain and Food Web, Population Ecology, Human Population environment, Animal Population
- Introduction to Micobes, Zoonosis and Immunology. Insects - Beneficial and harmful insects – Vectors, their life cycle & Metamorphosis- mechanism of causing diseases to human beings & animals - control measures, Domestic pests & their control measures.Rodents & their control
- Genetics, Biomolecules, Chemical bonds, Organic reactions, Catalysis, Volumetric Analysis, Purification of Organic Compounds, Polymers, Chromatography, Laboratory Hygeine and Safety Rules.
- Economic Entomology, Vermiculture, Economic Zoology
- Natural resources – Renewable and Non-Renewable resources. Environment & Sanitation – Air and Ventilation – Solid Waste Management – Bio-Medical Waste – Plastic Waste – Excreta – Liquid filth – disposal of the dead – Personal hygiene, camp sanitation, housing, Industrial and trade, Instruments & equipments for the Control & pests, vectors, rodents & diseases.

Unit–III: Micro biology

- Micro-organism - Beneficial & harmful micro-organisms, Metabolism, Enzymes, Vitamins, Immunology Human Anatomy and Physiology, Human Microbial diseases, Molecular biology and Genetic Engineering Medical Bacteriology, Virology, Mycology and Parasitology Sources of infection & mode of infections. Pathogenic micro organisms & their Control & Management. Mosquitoes, flies, bed bug, louse, fleece, ticks, mites, protozoans – their life cycle triematodes – Cestodes.

- Water borne, air borne diseases, Communical & non-communical diseases. Faecal contamination, coliforms in waterFood Microbiology, Environmental Microbiology and Industrial Microbiology. Microbial genetics, Vermiculture, Ecosystem

- Common diseases – infective diseases insect borne – air borne and water borne. Common diseases of the respiratory system and nervous system.

Unit–IV: Bio-Chemistry

- Nutrition education – Introduction to nutrition education – nutrition education for maternal and child health – Child Nutrition – Nutrition education – methods and media – Nutrition education and family health– Nutrition education in diet therapy –Carbo-hydrates, Proteins & Liquids.
- Chemicals used for the control of disease-causing organisms such as insects, bacteria, virus, actinomycetes, worms, rodents etc. Bio Physical chemistry, Collision Theory, Enzymes, Metabolism of food, Metabolic pathways, Food ecology.
- Genetics, Gene regulation, Vaccines, Bio analytical techniques, Nutritional Biochemistry, Bio Organic chemistry. Human Physiology and nutrition with Microbiology, Virology and basic immunology.
- Various sources of drugs, pharmacologically active constituents in plants. Classification of drugs, chemical – biological – mechanism of drug action– action at cellular sites. Drug receptors and biological responses. Mechanism of different types of drug action.
- Absorption of drugs – factors affecting absorption of drugs, routes of administration – local, enema, oral and external, parental routes – advantages and disadvantages –Indian medicinal plants – tulsi, neem, keezhanelli.
- AIDS – symptoms and prevention.
- Overview of Anesthetics, Antipyretics and anti-inflammatory agents, Antibiotics and Antiseptics and disinfectants. Composition of blood – blood grouping and matching. Blood pressure – Diabetes – and other non Communicable disease.

Unit–V: Public Health

- Public Health Services, Public Health administration, Public Health laboratories, Tamil Nadu Public Health act. Human Anatomy and Physiology, Statistics and basics of Epidemiology
- Drainage, Sanitary Convenience, Abatement of nuisance, Prevention, notification & treatment of diseases, Notified infectious diseases, Maternity & Child Welfare, Sanitation & Buildings, Abatement of Overcrowding, Lodging houses,Food control, Fairs & Festivals, Provisions of acts & rules selected to Public Health & Sanitation, SWM act – 2016, Registration of birth & death act 1969, Act & rules related to Waste Management & environment Management, National health program including AIDS, Polio, control measures of corona, Swine flu, dengue, Immunity & immunization Care & treatment of patients with infection, Disinfection & Sterilization, First aid & emergency care,Vital Health Statistics & maintenance of records.

- Human behaviour, Health Seeking Behavior & Social control, SBCC (Social and Behavioral Change Communication), Public Policy, Disasters and Health Management. Principles and modes of Health education & IEC activities.

Unit – VI: Environmental Science

- Water: Use and over – exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state).Water Contamination – BoD, CoD, Eutrophication, dissolved oxygen, flora & fauna in water bodies.
- Ecosystem and Environmental ecology, Ecology and health, Environmental Health, Population growth and explosion and impacts on environment, Role of IT in Environmental Health, Food chain and Web. Human health and welfare, Animal Population and human health
- Environmental Pollution: types, causes, effects and controls: Air, Water, soil and noise Pollution and control measures and management of Nuclear hazards and human health risks.
- Solid and Liquid Waste Management - Control measures of urban and industrial waste.
- Environmental Laws: Environment Protection Act, Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Resettlement and rehabilitation of projects affected persons.Disaster management: floods, earthquake, cyclone and landslides.Global Climate Change and its impacts. Environmental movements: Chipko, Silent Valley, Bishnois of Rajasthan. Environmental conservation. Environmental communication and public awareness.

Paper-I

CIVIL ENGINEERING

(Diploma Standard)

CODE NO:201

UNIT-I: ENGINEERING MECHANICS

Direct Stresses and strains (Tensile and compressive) due to Axial forces – Deformation of elastic bar due to uni-axial force - Shear force and bending moment diagrams for statically determinate beams - Geometrical properties of sections – Stresses in beams due to bending –Stresses in shafts due to torsion – Pin jointed perfect frames with vertical loads on nodal points (method of joints only).

UNIT-II: MECHANICS OF STRUCTURE

Deflection of cantilever and simply supported beams – Shear force and bending moment diagrams for statically indeterminate structures (Propped cantilever, Fixed Beams, continuous beams, Non-sway Portal frames) using Mohr's theorems and moment distribution method. Euler's and Rankin's formula for columns– Stresses due to eccentric loads – combined stresses due to direct loads and bending moments in rectangular sections.

UNIT-III: CONSTRUCTION MATERIALS & CONSTRUCTION PRACTICE

Bricks, Tiles, Cement, Fine Aggregate, Coarse Aggregate, Timber, Ply wood, Steel, Glass, Plastics, PVC, UPVC, Paints, Mortars, Concrete – Different types, qualities, requirements, standard specifications, Admixtures for cement mortar and concrete. Different types of Foundations, Masonry, Floors, Roofs, Doors and Windows, Weathering Course, Damp proof course, Plastering, Painting, Colour Washing – Specifications for different works.

UNIT-IV: TRANSPORTATION ENGINEERING

Roads – Different types – methods of formation of water bound macadam, bituminous and concrete roads – Hill roads – Requirements – Camber, gradient, super elevation, carriage way, pavements, drainage system, sight distance etc., Traffic Engineering, Bridges – Classification of bridges – Site selection and alignment – Foundation, substructure and super-structure. Sub-grade soil – Soil mass as a three phase system – Grain size classification - Atterberg limits – IS Classification of soils–Compaction – Shear strength – Road Arboriculture – Express Highways – Rapid Transport System.

UNIT-V: HYDRAULICS

Measurement of pressure in liquids – Pressure distribution and total pressure on immersed surfaces – Types of flow (Laminar, turbulent, steady, unsteady, uniform, nonuniform) – Flow through pipes –Losses – Hydraulic gradient and total energy lines. Bernoullis theorem – use of Orifice, Mouthpiece, Orifice meter and Venturimeters – Flow through channels – Bazin's and manning's formula – Economical sections for open channels, Pumps – Reciprocating pumps – Centrifugal

pumps – Characteristics – Discharge – Power and efficiency, Ground water – Types of well – Test for yield of wells.

UNIT-VI: SURVEYING

Types of Surveys –Chain surveying – Compass surveying – Levelling – Contour surveying–Theodolite surveying–Trignometrical leveling –Tacheometry– Field work – Simple problems. Curves, Global Positioning System (GPS), Remote sensing– Photogrammetric Surveying and Hydrographic Surveying, Total Station and Geographical Information System (GIS).

UNIT-VII: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water– Conveyance of water – Treatment of water – Quality of water– Tests on water –Distribution systems – Sewers – Collection and conveyance of sewage – Sewer Appurtenances – Drainage arrangements and Sanitary fittings in buildings – Treatment and disposal of sewage, Solid waste Management. Environmental pollution – Air – water – Soil – Noise - Pollution Control.

UNIT-VIII: ESTIMATING AND COSTING

Systems of taking out quantities – Trade and Group systems – Material requirement for different items of works – Preparation of data for works – Report writing – Valuation of buildings and properties – Fixation of rents – Approximate estimates – Detailed estimate and Abstract estimate for buildings, well, sump, septic tanks, compound wall, roads etc.

UNIT-IX: STRUCTURAL ENGINEERING

Reinforced cement concrete structure – Analysis and design of singly and Doubly reinforced rectangular and T-beam sections – Cantilever, simply supported, continuous beams – One way and two way slabs – Lintels and sunshades – Staircases – Rectangular and circular short columns – Isolated column footings. (All designs by Limit State Method only). Steel structures – simple beams – Tension and compression members – simple columns.

UNIT-X: CONSTRUCTION MANAGEMENT

Planning of a project – Factors to be considered – Project reports – Organization structure on construction departments – Construction planning – CPM and PERT networks – Contracts – Tenders and Tender documents – Bill-Supervision and Quality control – Safety measures in construction sites – Banking practice – Cash flow diagrams. Entrepreneurship, Ethics in Engineering, Use of computers – Information Management, Financial Management, Disaster Management – Types of Natural calamities – Causes for major disaster – Preparedness – Response and Recovery.

Paper-I

MECHANICAL ENGINEERING

(Diploma Standard)

CODE NO:202

UNIT-I: INDUSTRIAL MANAGEMENT

X and Y theories of Management, Contributions of Henry Fayol and F.W. Taylor for Management - job evaluation by Ranking method and factor comparison method - motivating techniques - fixing selling price of a product - break even analysis for make or buy decision – sinking fund method and straight line method of calculating depreciation- ABC analysis – determination of economic order quantity – TQM – ISO standards – certification.

UNIT-II : INDUSTRIAL ENGINEERING

Factors influencing plant location - principles of layout – techniques used to improve layout - primary and secondary causes of an accident - personal protective devices - method study procedure - flow diagram, string diagram and two handed process chart - principles of motion economy-procedure for conducting stopwatch time study, production study and ratio delay study - objectives of preplanning, routing, scheduling, despatching and controlling - difference between inspection and quality control - types of plant maintenance – TPM.

UNIT-III: PRODUCTION TECHNOLOGY

Foundry - patterns - special casting techniques - welding - hot and cold working – drawing, rolling and forging - powder metallurgy - plastics - rubber - ceramics- refractories - lathe work - planner - shaper - slotter - drilling machine - milling machines - grinding machines - broaching - boring and jig boring - Gears manufacturing practice - Heat treatment and metal finishing - press work

UNIT-IV: ELECTRICAL AND ELECTRONICS ENGINEEERING

Units, Ohm's law, Kirchoff's law, Faraday's law - D.C. Circuits, batteries - electro magnetism - single phase and three phase A.C. circuits - Induction motors – Electronics– diodes – resisitors – capacitors–transistors–logic gates.

UNIT-V: MECHANICS OF MATERIALS

Mechanical properties of metals - simple stresses and strains – modulus of elasticity - geometrical properties of sections - thin cylinders bending moment and shear force - theory of simple bending - torsion and springs - transmission of motion– gear drives and belt drives.

UNIT-VI: HEAT POWER ENGINEERING

Working principle and comparison of otto and diesel cycles - construction and working of two stroke and four stroke engines - Heat balance test on I.C. engine - working principle of single and multistage compressors - Comparison of reciprocating and rotary compressors - classification of steam boilers - construction and working of steam turbines- working principle of steam power plant - Main elements of a nuclear power plant - Vapour compression cycle - factors affecting human comfort - working principle of a window air conditioner and central air conditioning system.

UNIT-VII: COMPUTER APPLICATIONS

Working principle and constructional details of computer - classification of computer – Input / Output devices - flow charting – MS Office & Star Office – creating documents – presentations – sending emails.

UNIT-VIII: FLUID MECHANICS AND MACHINERY

Working of differential manometer - use of venturimeter and orifice classification of mouthpieces meter - working of pelton wheel, francis turbine and kaplan turbine - construction and working principle of reciprocating pump, centrifugal pump and gear pump - quick return mechanism of shaping machine - table movement in a milling machine.

UNIT-IX: COMPUTER INTEGRATED MANUFACTURING

CAD – Definition – geometric modeling – wireframe, surface and solid modeling – graphic standards – GKS, IGES, PHIGS and DXF. CAM–definition–group technology– part families–parts classification and coding–CAPP–types. CNC–definition–components of CNC–ATC–CNCEDM. Part program–format–coordinate system – types of motion control – types of interpolation – G and M codes – subprogram – canned cycles.

UNIT-X: DESIGN OF MACHINE ELEMENTS

Factors affecting selection of material – classification of bearings – sliding contact and rolling contact bearings – radial and thrust bearings – limits – fits – tolerance – classification of fits –cams and followers – types.

Paper-I

ELECTRICAL ENGINEERING

(Diploma Standard)

CODE No:203

UNIT–I: CIRCUIT THEORY AND DC MACHINES

Electrostatics - Fundamentals of electric circuits - DC Circuits - Network Theorems (Simple problems in DC) - Single phase AC and 3 phase AC circuits – Resonant circuits- Electro magnetism - DC Generator - Types - construction - working - characteristic curves - Armature reaction- application. DC Motor - Types - construction - working - characteristics - commutation - application - speed control – D.C Starters – Maintenance of DC machines – Storage batteries.

UNIT–II: A.C. MACHINES AND SPECIAL MACHINES

Single phase transformer - construction - EMF equation - OC & SC Test - Regulation and efficiency- parallel operation. Three phase transformer – construction– Testing - Parallel operation – Maintenance Alternator - construction - EMF equation - methods of obtaining sine-wave - parallel operation – Testing– Determination of voltage regulation. Synchronous Motor - construction - starting methods - application. 3 phase induction motor - construction and working principle - phasor diagram - starters - speed control - maintenance. Single phase induction motors - working principle – types- applications - Special machines - PMSM, SRM, Stepper motor, PMBLDC motors.

UNIT–III: MEASUREMENTS AND INSRUMENTS

Classification and characteristics of instruments - operating forces– construction and working of M.I., MC and Dynamometer type instruments – Instrument transformers- Direct measurement of current, voltage and resistance- Measurement of Power – Measurement of energy- single phase and 3 phase Energy meters. Measurement of power factor - Maximum demand indicator - Synchroscope- Measurement of frequency - AC Bridges - Anderson bridge - Schering bridge- Cathode ray Oscilloscope – Sensing elements - Transducers – Passive, active transducers.

UNIT-IV. ELECTRONIC DEVICES AND CIRCUITS

Semi conductor Diodes –Rectifiers – Half wave, full wave and Bridge rectifier- Filters- 3 phase rectifiers - Bipolar junction Transistors (BJT) – biasing – configuration - Field effect Transistors (JFET & MOSFET) and Uni junction Transistor (UJT) – Transistor oscillators - Special semiconductor devices - Gunn diode, varactor diode, Zener diode, Tunnel diode - Silicon controlled Rectifier - DIAC-TRIAC –IGBT –Opto electronic devices – LDR, LED, LCD, Opto coupler, IR transmitter and receiver,Laser diode , Solar cell, Photo diode, Photo transistor – Diode clipper – Diode clamper –Voltage doubler - Multi vibrators -Astable, Monostable, Bistable – Schmitt trigger.

UNIT–V: ANALOG AND DIGITAL ELECTRONICS

Operational amplifiers - characteristics – applications - Number system- Boolean algebra- De-Morgan's theorems - Logic gates- Digital logic families- Combinational circuits - Sequential circuits – Flipflops, Counters, shift registers – Memory devices - D / A and A / D converters.

UNIT–VI: GENERATION, TRANSMISSION AND SWITCH GEAR

Generation of electrical energy – Inter connected system – Load curves and load duration curves–Tariff -Economics of power generation - Fuel cells – AC transmission - voltage regulation and transmission efficiency - Sag – HVDC transmission - Line Insulators and Underground cables- Cable faults –Murray loop test for cable fault detection -Circuit breakers - Lightning arrestors - Fuses - HRC fuse – Protective relays - Grounding.

UNIT–VII: DISTRIBUTION AND UTILISATION

AC and DC Distribution - Substations – Busbar system - Industrial Drives - Types of electric drives and choice of electric motor. Electric Traction –System of track electrification -Traction mechanics - Traction motors and control – Magnetic levitation. Illumination - Laws of illumination –Lighting systems - construction and characteristics of Arc, incandescent, Sodium vapour, Mercury vapour CFL and LED lamps. Electric heating – Electric furnaces – Electric welding - Electric welding equipments.

UNIT–VIII: MICRO PROCESSOR AND MICRO CONTROLLER

Introduction to microprocessors - 8085 micro processor - Architecture – Instruction set – Addressing mode – Instruction cycle.

8051 micro controller – Architecture – Instruction set – Assembler - Addressing modes - Programmes – I/O programming – Timer programming- Serial communication – Interrupts- IC 8255 - Peripheral interfacing techniques with 8051 – Applications.

UNIT–IX:

A. POWER ELECTRONICS AND DRIVES

Thyristor family- SCR trigger circuits – Commutation circuits- Phase controlled rectifier – Choppers – Inverters – SMPS –UPS – Control of DC drives – Four quadrant control of DC motor - Control of AC drives.

B. ELECTRICAL ESTIMATION & ENERGY AUDITING

Indian Electricity Rules – 1956 - Standard symbols for various wiring items, accessories - Wiring systems – wire size – Selection of fuses - Earthing- Testing of installations - Domestic, commercial and industrial installation estimate – Energy auditing- Energy conservation – Selection of cable – Lighting systems – Pumping systems.

UNIT–X: CONTROL OF ELECTRICAL MACHINES

Control circuit components –Switches, relays, timers, contactors – DC motor control circuits- Jogging, dynamic braking, plugging, reversing control circuit- speed control using UJT& SCR – AC motor control circuits- DOL starter, Auto transformer starter, Star-delta starter – Rotor resistance starter – plugging –dynamic braking – Industrial control circuits - Programmable logic controller – Components of PLC - Inputmodule – output module - programming – Ladder diagram for DOL, star- delta starter.

Paper-I

ARCHITECTURE

(Diploma Standard)

CODE:205

UNIT–I: ENGINEERING MECHANICS

Simple Stresses and Strain – Stress and Strain – Modulus of Elasticity / Elastic constants – Application of stress and strain in engineering field – Behaviour of ductile and brittle material – Loads – Shear Force and Bending Moment – Geometrical properties of sections – Centroid – Moment of Inertia – Stress in Beams and Shafts – Stresses in Beams due to bending – Stress in shafts due to torsion – Pin Jointed Frames - Analytical Method – Graphical Method.

UNIT–II: BUILDING MATERIALS & CONSTRUCTION

Properties, characteristics, strengths, manufacturing, components & applications of materials & methods of construction & detailing for the following:

Stone – Brick & Clay Products – Lime – Cement – Timber – Concrete – Ferrous and Non- Ferrous Metals – Glass – Plastics – Asphalt, Sealants & Adhesives – Protective and Decorative Coatings – Water Proofing and Damps Proofing Materials – Rural Building Materials (Bamboo, Soil, etc.).

UNIT–III: HISTORY & THEORY OF ARCHITECTURE

History of Architecture

Egyptian Architecture – Greek Architecture – Roman Architecture – Early Christian & Byzantine Architecture – Gothic Architecture – Renaissance Architecture. Indian Architecture – Indus Valley Civilization, Buddhist Architecture, Hindu Architecture – Islamic Architecture in India. Modern Architecture, Post Modernism, Deconstructivism Contemporary World Architecture.

Theory of Architecture

Definition of Architecture – Architecture as satisfying functional, aesthetic & psychological human needs. Elements of Architecture – Form, Space, Light, colour, etc. Principles of Architecture – Proportion, Balance, Scale, Symmetry, etc.

UNIT–IV: STRUCTURAL ENGINEERING

Slope and Deflection of Beams – Propped Cantilevers – Fixed Beams – Arches – Continuous Beams – Theorem of Three Moments – Continuous Beams – Moment Distribution Method – Columns and Struts – Combined Bending and Direct Stresses – Earth Pressure and Retaining Walls – Working Stress Method Design of Beams for Flexure by L.S.M – Design of T-Beams and Continuous Beams by L.S.M– Design of Beams for Shear by L.S.M – Design of One way Slabs by L.S.M - Design of Two way Slabs by L.S.M - Design of Staircases by L.S.M - Design of Columns by L.S.M - Design of Column Footings – Design of Simple Beams – Design of Tension Members – Design of Compression Members – Design of Welded Connections.

UNIT–V: ENVIRONMENTAL ENGINEERING

Sources of Water – Collections and Conveyance of Water–Quality of Water– Treatment of Water – Distribution System – Appurtenances and Maintenance of Water Lines – Collections and Conveyance of Sewage – Treatments and Disposal – Environmental Pollution and Control - Industrial Waste Water Treatment and Solid Waste Disposal – Land, Water & Air Pollution.

UNIT–VI: BUILDING SERVICES

Water Supply & Sewage Disposal, Mechanical Systems – Pumps & Motors, Electrical Systems - Generation & Distribution, Ventilation & Lighting, Air Conditioning – Principles, systems & applications, Vertical Transportation systems, Fire Hazards, Safety & Design Regulations, Acoustics.

UNIT–VII: SITE SURVEY & PLANNING

Chain Surveying – Compass Surveying – Plane Table Surveying – Levelling – Theodolite – Contouring – Minor Instruments. Site Drawings – Site marking, Importance & procedures for making site drawings & dimensioning.

UNIT–VIII: SPECIFICATION & ESTIMATION

Stages of Detailed Estimate – Measurements & Material Requirement – Specification & Report Writing – Approximate Estimates – Areas and Volumes – Data – Valuation – Detailed Estimate.

UNIT–IX: TOWN PLANNING

Town Planning Principles – Road and Street Planning – Housing – Economy, Society, Environment and Transport Policy and Planning – Town Planning Rules, Building Bye-Laws & Development Control Rules.

UNIT–X: COMPUTER AIDED DRAFTING & VISUALIZATION

2D & 3D Drafting & Visualization - Using AutoCAD, etc – Setting limits and creating entities like LINE, ARC, CIRCLE etc – Editing the drawing with edit commands like TRIM, FILLET, COPY, MOVE etc., Creating 2D building working drawings. Visualization using SKETCH UP, 3D MAX, etc.

Paper-II

Part-A

TAMIL ELIGIBILITY TEST

(கட்டாயத்தமிழ் மொழித்தகுதி தேர்விற்கான பாடத்திட்டம்)

(கொள்குறி வினாவிற்கான தலைப்புகள்)

பத்தாம் வகுப்பு தரம்

1. பிரித்தெழுதுதல் / சேர்த்தெழுதுதல்.
2. எதிர்ச்சொல்லை எடுத்தெழுதுதல்.
3. பொருந்தாச் சொல்லைக் கண்டறிதல்.
4. பிழைத்திருத்தம் (1) சந்திப்பிழையை நீக்குதல் (2) மரபுப்பிழைகள், வழுவுச் சொற்களை நீக்குதல் / பிறமொழிச் சொற்களை நீக்குதல்.
5. ஆங்கிலச் சொல்லுக்கு நேரான தமிழ்ச் சொல்லை அறிதல்.
6. ஒலி மற்றும் பொருள் வேறுபாடறிந்து சரியான பொருளையறிதல்.
7. ஒரு பொருள் தரும் பல சொற்கள்.
8. வேர்ச் சொல்லைத் தேர்வு செய்தல்.
9. வேர்ச் சொல்லைக் கொடுத்து / வினைமுற்று, வினையெச்சம், வினையாலணையும் பெயர், தொழிற் பெயரை / உருவாக்கல்.
10. அகர வரிசைப்படி சொற்களை சீர்செய்தல்.
11. சொற்களை ஒழுங்குப்படுத்தி சொற்றொடராக்குதல்.
12. இரு வினைகளின் பொருள் வேறுபாடு அறிதல். (எ.கா) குவிந்து, குவித்து.
13. விடைக்கேற்ற வினாவைத் தேர்ந்தெடுத்தல்.
14. எவ்வகை வாக்கியம் எனக் கண்டெழுதுதல் – தன்வினை, பிறவினை, செய்வினை, செயப்பாட்டு வினை வாக்கியங்களை கண்டெழுதுதல்.
15. உவமையால் விளக்கப்பெறும் பொருத்தமான பொருளைத் தேர்ந்தெழுதுதல்.
16. அலுவல் சார்ந்த சொற்கள் (கலைச்சொல்).
17. விடை வகைகள்.
18. பிறமொழிச் சொற்களுக்கு இணையான தமிழ்ச் சொற்களைக் கண்டறிதல். (எ.கா) கோல்டு பிஸ்கட் – தங்கக்கட்டி.
19. ஊர்ப் பெயர்களின் மரூஉவை எழுதுக. (எ.கா) தஞ்சாவூர்- தஞ்சை.
20. நிறுத்தற் குறிகளை அறிதல்.
21. பேச்சு வழக்கு, எழுத்து வழக்கு (வாரான் – வருகிறான்).
22. சொற்களை இணைத்து புதிய சொல் உருவாக்கல்.
23. பொருத்தமான காலம் அமைத்தல் (இறந்தகாலம், நிகழ்காலம், எதிர்காலம்).
24. சரியான வினாச் சொல்லைத் தேர்ந்தெடு.

25. சரியான இணைப்புச் சொல் (எனவே, ஏனெனில், ஆகையால், அதனால், அதுபோல).

26. அடைப்புக்குள் உள்ள சொல்லைத் தகுந்த இடத்தில் சேர்க்க.

27. இரு பொருள் தருக.

28. குறில் – நெடில் மாற்றம், பொருள் வேறுபாடு.

29. கூற்று, காரணம் – சரியா? தவறா?

30. கலைச் சொற்களை அறிதல்.
    எ.கா. – Artificial Intelligence – செயற்கை நுண்ணறிவு
    Super Computer – மீத்திறன் கணினி

31. பொருத்தமான பொருளைத் தெரிவு செய்தல்.

32. சொற்களின் கூட்டுப் பெயர்கள் (எ.கா) புல் – புற்கள்.

33. சரியான தொடரைத் தேர்ந்தெடுத்தல்.

34. பிழை திருத்துதல் (ஒரு-ஓர்).

35. சொல் - பொருள்- பொருத்துக.

36. ஒருமை – பன்மை பிழை.

37. பத்தியிலிருந்து வினாவிற்கான சரியான விடையைத் தேர்ந்தெடு.

Paper-II

Part-B

GENERAL STUDIES

(Degree Standard)

CODE NO. 301

UNIT-I: GENERAL SCIENCE

1. Scientific Knowledge and Scientific temper – Power of Reasoning.
2. Rote Learning Vs Conceptual Learning - Science as a tool to understand the past, present and future.
3. Nature of Universe - General Scientific Laws – Mechanics -Properties of Matter, Force, Motion and Energy - Everyday application of the basic principles of Mechanics, Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Laser, Electronics and Communications.
4. Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilizers, Pesticides.
5. Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases.
6. Environment and Ecology.

UNIT-II: CURRENT EVENTS

1. History-Latest diary of events – National symbols – Profile of States – Eminent personalities and places in news – Sports - Books and authors.
2. Polity-Political parties and political system in India-Public awareness and General administration -Welfare Oriented Government schemes and their utility, Problems in Public Delivery Systems.
3. Geography-Geographical landmarks.
4. Economics- Current socio-economic issues.
5. Science-Latest inventions in Science and Technology.
6. Prominent personalities in various spheres- Arts, Science, Literature and Philosophy.

UNIT-III: GEOGRAPHY OF INDIA

1. Location – Physical features - Monsoon, rainfall, weather and climate - Water resources - Rivers in India - Soil, minerals and natural resources - Forest and wildlife - Agricultural pattern.
2. Transport - Communication.
3. Social geography – Population density and distribution - Racial, linguistic groups and major tribes.
4. Natural calamity – Disaster Management – Environmental pollution: Reasons and preventive measures – Climate change – Green energy.

UNIT–IV: HISTORY AND CULTURE OF INDIA

1. Indus valley civilization - Guptas, Delhi Sultans, Mughals and Marathas - Age of Vijayanagaram and Bahmani Kingdoms - South Indian history.
2. Change and Continuity in the Socio-Cultural History of India.
3. Characteristics of Indian culture, Unity in diversity – Race, language, custom.
4. India as a Secular State, Social Harmony.

UNIT-V: INDIAN POLITY

1. Constitution of India-Preamble to the Constitution-Salient features of the Constitution - Union, State and Union Territory.
2. Citizenship, Fundamental rights, Fundamental duties, Directive Principles of State Policy.
3. Union Executive, Union legislature – State Executive, State Legislature – Local governments, Panchayat Raj.
4. Spirit of Federalism: Centre-State Relationships.
5. Election-Judiciary in India–Rule of law.
6. Corruption in public life – Anti-corruption measures – Lokpal and LokAyukta - Right to Information - Empowerment of women – Consumer protection forums, Human rights charter.

UNIT-VI: INDIAN ECONOMY

1. Nature of Indian economy – Five year plan models - an assessment – Planning Commission and Niti Ayog.
2. Sources of revenue – Reserve Bank of India – Fiscal Policy and Monetary Policy - Finance Commission – Resource sharing between Union and State Governments - Goods and Service Tax.
3. Structure of Indian Economy and Employment Generation, Land reforms and Agriculture - Application of Science and Technology in agriculture - Industrial growth - Rural welfare oriented programmes – Social problems – Population, education, health, employment, poverty.

UNIT-VII: INDIAN NATIONAL MOVEMENT

1. National renaissance – Early uprising against British rule -Indian National Congress - Emergence of leaders – B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, Jawaharlal Nehru, Kamarajar, Mahatma Gandhi, Maulana Abul Kalam Azad, Thanthai Periyar, Rajaji, Subash Chandra Bose, Rabindranath Tagore and others.
2. Different modes of Agitation: Growth of Satyagraha and Militant movements.
3. Communalism and partition.

UNIT-VIII: History, Culture, Heritage and Socio - Political Movements in Tamil Nadu

1. History of Tamil Society, related Archaeological discoveries, Tamil Literature from Sangam age till contemporary times.
2. Thirukural : (a) Significance as a Secular literature
   (b) Relevance to Everyday Life.

(c) Impact of Thirukkural on Humanity

(d) Thirukkural and Universal Values-Equality, Humanism, etc.,

(e) Relevance to Socio – Politico – Economic affairs.

(f) Philosophical content in Thirukkural

3. Role of Tamil Nadu in freedom struggle–Early agitations against British Rule - Role of women in freedom struggle.
4. Evolution of 19th and 20th Century Socio-Political movements in Tamil Nadu– Justice Party, Growth of Rationalism- Self Respect Movement, Dravidian movement and Principles underlying both these movements, Contributions of Thanthai Periyar and Perarignar Anna.

UNIT– IX : Development Administration in TamilNadu

1. Human Development Indicators in Tamil Nadu and a comparative assessment across the Country – Impact of Social Reform movements in the Socio-Economic Development of Tamil Nadu.
2. Political parties and Welfare schemes for various sections of people – Rationale behind Reservation Policy and access to Social Resources - Economic trends in Tamil Nadu – Role and impact of social welfare schemes in the Socio-economic development of Tamil Nadu.
3. Social Justice and Social Harmony as the Cornerstones of Socio - Economic development.
4. Education and Health systems in Tamil Nadu.
5. Geography of Tamil Nadu and its impact on Economic growth.
6. Achievements of Tamil Nadu in various fields.
7. e-governance in Tamil Nadu.

UNIT-X : APTITUDE AND MENTAL ABILITY

1. Simplification – Percentage - Highest Common Factor (HCF) -Lowest Common Multiple (LCM).
2. Ratio and Proportion.
3. Simple interest-Compound interest-Area-Volume-Time and Work.
4. Logical Reasoning – Puzzles – Dice - Visual Reasoning - Alpha numeric Reasoning– Number Series.

Paper - II

Part-B

GENERAL STUDIES

(Diploma Standard)

Code No. 401

UNIT-I: GENERAL SCIENCE

1. Nature of Universe – Measurement of Physical Quantities – General Scientific Laws in Motion – Force, Pressure and Energy – Everyday application of the basic principles of Mechanics, Electricity, Magnetism, Light, Sound, Heat and Nuclear Physics in our daily life.
2. Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilizers, Pesticides, Metallurgy and Food Adulterants.
3. Main concepts of Life Science, Classification of living organisms, Evolution,Genetics,Physiology,Nutrition, Health and Hygiene,Human diseases.
4. Environmental Science.

UNIT-II: CURRENT EVENTS

1. Latest diary of events – National symbols–Profile of states –Eminent personalities and places in news–Sports –Books and Authors.
2. Welfare Scheme of Government – Political parties and Political system in Tamil Nadu and India.
3. Latest inventions in Science and Technology – Geographical Land Marks – Current Socio – Economic issues.

UNIT-III: GEOGRAPHY

1. Earth Location – Physical Features – Monsoon, rainfall, weather and climate– Water resources–Rivers –Soil, Minerals and Natural resources– Forest and Wildlife–Agriculture pattern.
2. Transport– Communication.
3. Population density and distribution in Tamil Nadu and India.
4. Calamities–Disaster Management–Environment – Climate change.

UNIT-VI: HISTORY AND CULTURE OF INDIA

1. Indus Valley Civilization –Guptas, Delhi Sultans, Mughals and Marathas – South Indian History.
2. Characteristics of Indian Culture, Unity in Diversity–Race, Language, Custom.
3. India as a Secular State.

UNIT-V: INDIAN POLITY

1. Constitution of India–Preamble to the Constitution–Salient features of the Constitution–Union, State and Union Territory.

2. Citizenship, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy.
3. Union Executive, Union Legislature–State Executive, State Legislature–Local Governments, Panchayat Raj.
4. Spirit of Federalism: Centre-State Relationships.
5. Election–Judiciary in India–Rule of Law.
6. Corruption in public life – Anti-Corruption measures – Lokpal and Lokayukta – Right to Information – Empowerment of Women – Consumer Protection Forums – Human Rights Charter.

UNIT-VI: INDIAN ECONOMY

1. Nature of Indian economy–Five year plan models – an assessment – Planning Commission and NITI Aayog.
2. Sources of revenue–Reserve Bank of India – Finance Commission–Resource sharing between Union and State Governments –Goods and Service Tax.
3. Economic Trends – Employment Generation, Land Reforms and Agriculture – Application of Science and Technology in Agriculture – Industrial growth – Rural Welfare oriented programmes – Social Problems –Population, Education, Health, Employment, Poverty.

UNIT-VII: INDIAN NATIONAL MOVEMENT

1. National Renaissance –Early uprising against British Rule–Indian National Congress – Emergence of Leaders –B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, ThanthaiPeriyar, Jawaharlal Nehru, Rabindranath Tagore, Kamarajar, Mahatma Gandhi, Maulana AbulKalam Azad, Rajaji, Subhash Chandra Bose, Muthulaksmi Ammaiyar, Muvalur Ramamirtham and other National Leaders.
2. Different modes of Agitation of Tamil Nadu and movements.

UNIT-VIII: HISTORY, CULTURE, HERITAGE AND SOCIO - POLITICAL MOVEMENTS OF TAMIL NADU

1. History of Tamil Society, related Archaeological Discoveries, Tamil Literature from Sangam age till contemporary times.
2. Thirukkural:

   a) Significance as a Secular Literature.

   b) Relevance to Everyday Life.

   c) Impact of Thirukkural on Humanity.

   d) Thirukkural and Universal Values – Equality, Humanism etc.

   e) Relevance to Socio – Politico –Economic affairs.

   f) Philosophical content in Thirukkural.

3. Role of Tamil Nadu in freedom struggle – Early agitations against British Rule– Role of women in freedom struggle.
4. Various Social reformers,Social reform movements and
5. Social transformation of Tamil Nadu.

UNIT-IX: DEVELOPMENT ADMINISTRATION IN TAMIL NADU

1. Social Justice and Social Harmony as the Cornerstones of Socio-Economic Development.
2. Education and Health systems in Tamil Nadu.
3. Geography of Tamil Nadu and its impact on Economic growth.

UNIT-X: APTITUDE & MENTAL ABILITY TESTS

1. Simplification–Percentage–Highest Common Factor(HCF)– Lowest Common Multiple(LCM).
2. Ratio and Proportion.
3. Simple Interest– Compound Interest–Area–Volume–Time and Work.
4. Logical Reasoning – Puzzles – Dice–Visual Reasoning–Alpha Numeric Reasoning– Number Series.