

ANNEXURE-III**SCHEME AND SYLLABUS FOR THE POST OF ASSISTANT ENGINEER, MUNICIPAL ASSISTANT ENGINEER, TECHNICAL OFFICER AND JUNIOR TECHNICAL OFFICER IN VARIOUS ENGINEERING DEPARTMENTS****SCHEME OF EXAMINATION**

WRITTEN EXAMINATION (Objective Type)	No. of Questions	Duration (Minutes)	Maximum Marks
Paper-I: General Studies and General Abilities	150	150	150
Paper-II: Civil Engineering (Diploma Level) OR Mechanical Engineering (Diploma Level) OR Electrical and Electronics Engineering (Diploma Level)	150	150	150
Total			300

NAME OF THE PAPERS	LANGUAGE OF EXAMINATION
Paper-I: General Studies and General Abilities	Bilingual i.e., English and Telugu
Paper-II: Concerned Subject (Diploma Level)	English

Syllabus**PAPER-I: GENERAL STUDIES AND GENERAL ABILITIES**

1. Current Affairs – Regional, National and International
2. International Relations and Events.
3. General Science; India's achievements in Science and Technology
4. Environmental issues and Disaster Management
5. Economy of India and Telangana
6. Geography of India with a focus on Telangana
7. Indian Constitution and Polity with a focus on local self Government
8. Society, Culture, Heritage, Arts and Literature of Telangana
9. Policies of Telangana State
10. History of Modern India with a focus on Indian National Movement
11. History of Telangana with special emphasis on Movement for Telangana Statehood
12. Logical Reasoning, Analytical Ability and Data Interpretation
13. Basic English (8th Class Standard)

PAPER-II: CIVIL ENGINEERING (DIPLOMA LEVEL)

1. Surveying

Fundamental concepts; Classification of Surveys; Chain Surveying; Compass Surveying; Levelling and Contouring; Theodolite Surveying; Tacheometry; Curves; Introduction and fundamental concepts of electronic measuring instruments - EDM, Total Station, GIS & GPS.

2. Construction Materials & Practice

Properties and uses of construction materials - Stones, Bricks, Tiles, Sand, Cement, Timber, Plastics, Glass, Asbestos, Paints, Distempers, Enamels and Varnishes; Preparation of Cement mortar for various works.

Classification of Buildings as per NBC, Site investigation for foundation as per NBC - Trial Pit and auger boring, classification of foundations, construction of spread footing and well foundation; Stone and Brick masonry - types and principles of construction; Doors and Windows - types, fittings and fastenings, types and functions of Lintels, Sunshades and Roofs, Flooring - Construction and types of material; Types of Stairs; Scaffolding; Types of Plastering, Pointing, Painting and White / Colour Wash.

3. Engineering Mechanics and Strength of Materials

Forces - types of Forces, Parallelogram, Triangle and Polygon Law of Forces, Lami's theorem; Centre of Gravity and Moment of Inertia; Simple stresses and strains, Hooke's law – stress strain diagram, working strength, elastic constants, Poisson's ratio, Relationship between elastic constants, compound rods, temperature stresses, strain energy, proof resilience, impact loading; Shear force and bending moment diagrams for simply supported, over hanging and cantilever beams, relation between intensity of loading, shear force and bending moment; Theory of simple bending, modulus of section, moment of resistance, distribution of shear stress in rectangular, circular and I-Sections; Deflection in cantilever and simply supported beams subjected to simple loading; Columns and struts - Euler's and Rankine's formulae, Slenderness ratio, simple built-up columns; Analysis of dams and retaining walls; Simple plane and pin-jointed trusses, Stresses by method of joints and method of sections.

4. Hydraulics

Properties of fluids, fluid pressure and its measurement; Types of flows, energies in fluid motion, Bernoulli's theorem and its applications – venture metre, pitot tube; Orifice and mouthpiece; Notches and weirs; Flow through pipes, hydraulic gradient line and total energy line, laminar and turbulent flow in pipes - Reynolds number, measurement of velocity; open channels; Water turbines – classification, centrifugal and reciprocating pumps; Layout of hydroelectric power plant.

5. Quantity Surveying

Abstract estimate, detailed estimate - centreline and long & short wall method, various items of Civil Engineering works as per Indian Standards; General Specifications - earth work, brick / stone masonry in cement mortar, RCC, plastering in cement mortar, Floor finishes with ceramic tiles and marbles, white washing, colour washing; Standard schedule of rates, lead and lift, preparation of lead statement; Computation of earth work - Mid-ordinate, Mean Sectional area, Trapezoidal method, Prismoidal Rule; Approximate estimate – Plinth area and cubic rate estimate.

6. Design of Structures (RCC and Steel)

RCC structures: Design philosophies – principles and concepts of working stress method and limit state method, loads and permissible stresses, IS specifications, analysis and design - rectangular beam, slab, T-beam, column, footing and stair case.

Steel Structures: Properties of steel sections, loads and permissible stresses, IS specifications, Analysis and design - welded joints, beam, column, column base, tension member; Design of roof truss.

7. Irrigation Engineering

Definitions, duty, delta, base period, rainfall and its measurement, factors affecting runoff, methods of computing maximum flood discharge; Classification of head works, component parts of a weir and barrage, factors influencing selection of site - reservoirs and dams; Classification of canals, canal lining, cross drainage works; Soil erosion, water logging, soil water plant relationship; Necessity of irrigation - advantages and disadvantages, irrigation methods.

8. Environmental Engineering

Basics of ecosystem, water supply scheme; Sources of water; Conveyance of water – pipes, joints and laying; Testing of water, drinking water standards; Treatment of water; Distribution of water; Water supply connection to a building.

Quantity of sewage, surface drains, design of sewers running half full, limiting velocities; Laying of sewers, sewer appurtenances; Collection of sewage samples, characteristics of domestic and industrial sewage – BOD, COD; Sewage treatment, septic tank & soak pit, sewage disposal - dilution and sewage farming; House drainage arrangements in buildings; Solid waste - collection and disposal; Air Pollution - sources, effects and controlling methods.

9. Transportation Engineering

Alignment of roads - plain and hilly terrain, surveys; Cross section of road structure, width of pavement, Camber, Gradient, Super elevation, Transition curves, horizontal and vertical alignment; Pavement marking, traffic signs, traffic islands.

Types of soil, classification of soil - Textural, IS Classification, physical properties - plasticity, cohesion, consolidation, compaction, permeability, compressibility, soil moisture content, specific gravity, density; Bearing capacity of soil.

PAPER-II: MECHANICAL ENGINEERING (DIPLOMA LEVEL)

1. Thermal Engineering:

Thermodynamics: Thermodynamic systems and properties – Zeroth law of thermodynamics - First law of thermodynamics – Second law of thermodynamics – Steady flow energy equation - Laws of perfect gases – Characteristics gas equation – Universal gas equation. Thermodynamic processes – Entropy – Air stand cycles – Carnot cycle – Otto cycle – Diesel cycle. Properties of steam - Sensible heat - Latent heat – Degree of super heat - Dryness fraction - Simple calculations on enthalpy of steam without using steam tables and Mollier chart. Refrigeration and Air conditioning – Fundamentals of refrigeration - Definition and meaning of refrigeration – Unit of refrigeration – COP – Carnot Refrigeration cycle and Bell column refrigeration cycle. Fuels – Types of fuels – Calorific values – Bomb calorimeter and Junker gas calorimeter.

Heat Engines: Internal Combustion Engines – Components of IC engines - Working principle – Valve and Port timing diagrams - Working of simple carburetor - Cooling system - Ignition system - Governing and Super charging of IC engines. Air compressors – Type of compressors – Single stage compressor – Multi stage Compressor - Rotary compressors. Gas turbines – Classification – Working of Constant Pressure (Open, closed and Semi closed) gas turbines - Applications and limitations of gas turbines. Steam Boilers – Classification – Working and differences between fire tube and water tube boilers - Mountings and Accessories – Performance of Boiler. Steam nozzles & Turbines – Flow through steam nozzles – Velocity and discharge through steam nozzles – Critical pressure ratio - Classification of turbines - Working principle of impulse and reaction turbines - Expression for Axial thrust, Tangential thrust, Work done and efficiencies – Methods of compounding – Governing of turbines.

Automobile Engineering: Identify of the various components of an Automobile - Functions of basic structure, power plant, transmission system, auxiliaries, Control of the Automobile - Concept of total resistance.

2. Manufacturing Technology:

Methods of manufacturing processes: Foundry - Mechanical working of metals - Powder metallurgy - Welding, soldering and brazing - Lathe and Lathe work - Drilling machines – Shaper, Slotter and Planer – Broaching Machines - Milling and Grinding machines - Modern machining processes - USM, AJM, EDM and LBM Processes - Plastics and Plastic processing - Press tools - Jigs and Fixtures. **Metrology:** Linear and Angular measurements – Comparators - Measurement of surface roughness - Collimators - Interferometer.

3. Engineering Mechanics & Strength of Materials:

Statics: Scalar and Vector quantities - Force - System of forces – Composition and resolution of forces - Resultant of forces – Parallelogram law of forces – Moment of a force – Law of moments – Varignon's principle – Parallel forces and their resultant - Couples and moment of a couple - Equilibrium and equilibrant – Conditions for equilibrium - Triangle and Polygon law of forces - Lami's theorem. Friction - Simple machines - Centre of gravity - Moment of Inertia.

Dynamics: Linear Motion – Motion under gravity - Newton's laws of motions – Impulse - Law of Conservation of momentum and Recoil of gun – Work, Power and Energy – Circular motion – Centripetal force – Motion of a vehicle on level circular track – Super elevation - Simple Harmonic motion – Applications of SHM.

Strength of Materials: Simple stresses and strains – Stress and strain diagram - Hooke's law – Elastic constants - Poisson's ratio - Relationship between elastic constants - Temperature stresses - Strain energy - Shear force and bending moment diagrams – Type of beams - Types of loads - SF and BM diagrams with Point load and uniformly distributed loads for Cantilever and Simply supported beam - Theory of simple bending – Bending equation - Bending stress - Modulus of section – Deflection and slope of Cantilever and simple supported beam with Point load and uniformly distributed load - Torsion of shafts - Springs - Thin cylindrical shells.

4. Machine Design:

Design factors - Factor of safety - Limits, tolerances and fits – Conventional symbols of Materials and machine components - Welding symbols - Surface roughness values and symbols - Specifications of materials and standard components - Bolts, Nuts and screws - Shafts, keys and couplings - Belt, chain and Gear drives – Cams - Fly wheel – Governors.

5. Engineering Materials:

Mechanical properties of engineering materials - Testing and structure of materials - Production of iron and steel – Iron/carbon equilibrium diagram - Heat treatment of steels - Ferrous and non ferrous metals and their alloys.

6. Hydraulics and Hydraulics Machinery:

Hydraulics: Properties of fluids - Fluid pressure and its measurement - Types of fluid flow – Reynolds's Number – Equation of Continuity - Energy of fluids - Bernoulli's theorem – Venturimeter - Pitot tube – Hydraulic Co-efficients. *Flow through pipes:* Concept of loss of head in pipes due to friction - Darcy's and Chezy's formulae - Hydraulic gradient line and total energy line - Power transmission through a pipe – Syphon – Transmission efficiency - Condition for max. power transmission through a pipe.

Hydraulics Machines: Impact of jets - *Water turbines:* Classification of turbines - Pelton wheel - Francis turbine - Kaplan turbine – Expressions for Work, Power, and Efficiencies of Pelton wheel, Francis Turbine and Kaplan Turbine - Differences between turbines - Governing of turbines. - Hydro electric power plant and its Lay out. *Pumps:* Classification of pumps - Construction and working of Reciprocating single acting/double acting pumps – Expressions for discharge, slip, Work and Power – Air vessel. *Centrifugal pumps:* Construction and working of Centrifugal pumps - Expression for Work, Power, Manometric head and Efficiencies – Differences between Pumps – Priming - Foot Valve and strainer – Cavitation.

7. Industrial Engineering and Management:

Management: Principles and functions of management - Organization structure and organizational behavior – Production Management - Material management - Marketing and sales.

Industrial Engineering: Work study - Wages and incentives - Fundamentals of estimation – Depreciation - Elements of Costing.

PAPER-II: ELECTRICAL AND ELECTRONICS ENGINEERING (Diploma Level)

1. BASIC ELECTRICAL ENGINEERING & BATTERIES

Basics of Electrical Engineering – Ohms law – Laws of resistance – Resistances in series & parallel – Work, Power, Energy – Heating effects of Electric current – Magnetic Effects of Electric current – Electromagnetic induction – Electrostatics – conducting, Insulating, Semiconductor materials – Special purpose materials – Basics of Batteries – construction, working principle, Efficiencies, charging methods, Applications of batteries.

2. ELECTRICAL CIRCUITS

D.C.Circuits, Network Theorems with reference to D.C., A.C. Circuits and fundamentals of A.C – Series circuits, Parallel circuits, resonance Q-factor, Polyphase circuits, Relation between phase value and line value in star and delta circuits, measurement of 3-phase Power with 2-watt meter method.

3. DC MACHINES

Basics of D.C.Generators – Theory, Construction, working, Classification, EMF Equation, Losses & Efficiency, Armature Reaction, Commutation, Characteristics, Parallel operation & Applications of D.C Generators – Basics of D.C Motors – Theory, Construction, Working, Classification, Back EMF, Torque, Characteristics, Applications, Speed control of DC Motors – Starters for D.C Motors – Testing of DC Motors.

4. MEASURING INSTRUMENTS

Basic of measuring instruments – Theory, Construction, Working, Errors, Advantages, Disadvantages & Applications, of M.C, M.I, Dynamometer & Induction meters, single phase and three phase Energy Meters, PF Meter, Weston frequency meter, Weston Synchroscope, Trivector meter. Measurement of resistance – Potentiometers – Various types of Transducers and Sensors – Various types Electronic & digital measuring instruments.

5. AC MACHINES

Transformers: Principle, construction working, classifications, EMF Equations, theory of transformers, Equivalent circuit, regulation, losses, efficiency, All-day efficiency testing – Auto transformer – 3-phase transformers – Instrument transformers – parallel operation; Alternator – Principle, construction, working, EMF Equation, Armature reaction, voltage regulations, testing parallel operation, load sharing; 3-phase Synchronous Motors – Construction, working, effect of excitation, V curve, inverted V curve, hunting, methods of starting, Speed variation methods, applications; 3-phase induction Motor-construction, working, types, Slip, torque, torque-slip curves, Equivalent circuit, power stages, testing, circle diagrams, starters, speed control and applications; 1-phase Induction Motors – Construction, Principle of working and applications of split phase, capacitors start, capacitors start & run, shaded pole, Commutator motors – Construction working, speed control and applications of A.C Series motor, universal motor, stepper motors, permanent magnet brushless motors.

6. ELECTRONICS ENGINEERING

Basic semiconductor devices and their characteristics – power supplies – amplifiers – oscillators – CRO – IC Timers – special devices; Number systems – Basic logic gates – Boolean algebra – adders – subtractors – A/D, D/A converters – Flip Flops – Registers – counters & memories; Architecture of 8051 micro controller – instruction set – programming concepts.

7. POWER SYSTEMS

Conventional & Non Conventional Energy sources. Construction, working, maintenance & suitability of thermal, hydro and nuclear power stations – Energy auditing – Gas power station - principle & working, combined operation & Economics of power stations; Switch Gear – Theory of electric arc and its quenching – circuit breakers – reactors and short circuit KVA calculations. Relays – over current, directional, impedance and distance relays; Protection of alternators & transformers. Transmission lines – short, medium transmission lines and various calculations- Regulation, charging currents – Ferranti effect, corona – hot line techniques; HVDC Transmission- Basic components and advantages; Line Structures – Sag calculations- insulators – string voltage, efficiency and guarding; Substations-Classification-equipment, layout and earthing of 132/11KV&33/11 KV substations; Distribution System: Feeders-distributors – service mains-voltage drop calculations. Protection of transmission lines ad feeder – lightning arresters-neutral grounding.

8. ELECTRICAL INSTALLATION & ESTIMATION
Estimation of lighting & power loads – OH Lines & Earthing, departmental tests, REC & Electrical act-2013, Maintenance of electrical machines.
9. UTILISATION & TRACTION
Principle of lighting – types of lamps – construction & Working – laws of illumination – illumination calculation. Heating, Welding; Electric drives – Load curves – motors for different applications; Electric braking for D.C& A.C motors. Electric traction – Speed time curves – Co-efficient of adhesion – over head equipment – supply system.
10. POWER ELECTRONICS
Basics of power electronic devices - Construction, Working, theory, Characteristic, Advantages, Disadvantages, Applications & mechanism of protection of SCR, TRIAC, DIAC, GTO, UJT, IGBT, converters, inverters, AC regulators, Choppers, Cycloconverters – Speed control of AC& DC Motors using Power electronic devices – Applications of power electronic devices.