

TENTATIVE SYLLABUS FOR OVERSEER/DRAFTSMAN GR.I

(KERALA WATER AUTHORITY)

COMMON SUBJECTS

Engineering Mechanics: Simple Machines, Force, Resolution of forces, Resultant force, Work & Power, Energy, Units and conversion, Friction and its types, Equation of linear motion, mass, weight and momentum, D'Alembert's Principle, Motion of lift, Projectile Motion, Collision of two bodies, SHM, Centre of gravity, Moment of inertia

Fluid mechanics: Properties of fluid, Fluid pressure and its measurement, Kinematics and Dynamics of fluid flow, Bernoulli's equation and its application, Flow through Orifices, notches, pipes and nozzles, Fluid Power, Hydraulic System, Hydraulic Control elements and components, Pneumatic system, Pneumatic control elements and components

Hydraulic Machines: Impacts of jets, Impulse Turbines, Reciprocating Turbines, Draft tubes, Specific speed, Centrifugal Pump, Priming, Efficiencies, Multistage pumps, Reciprocating Pumps, Model Laws

Strength of Materials: Direct stress and strains, Poissons ratio, Stress strain Diagram, Factor of Safety, Elastic constants, Hook's Law, Shear stress and shear strain, thermal stress and thermal strain, Truss analysis, method of joints and method of sections, Riveted joints, Welded Joints, Thin Cylinders, Torsion of Circular shafts, Springs, Shear force and bending moment diagram, Deflection of beams, Bending equation, Columns and struts, buckling load, Slenderness ratio, Euler's Equation

Basic Engineering Drawing: Drawing instruments, uses, equipment and materials, type and layout of drawing sheet, lines. Lettering, dimensioning and scale Plane geometrical construction Conic section and

projection.

AutoCAD: Introduction to AutoCAD Basic ,commands, Drawing toolbar and modifying toolbar, Plotting and printing, function keys, short cut keys etc.

Units and Measurements: Units of measurements Measurement of Perimeter and Area of triangles Polygons and circles Volume of Solids, Volume & Area calculations Simpson's rule, Trapezoidal rule.

CIVIL ENGINEERING

Surveying and Levelling: Introduction, Chain Surveying: Instruments used, errors, obstacles in chaining. Plane table surveying: Accessories, methods (radiation, intersection, resection, 3 & 2 point). Compass surveying: Prismatic & surveyor's compass, types of bearings, conversion, local attraction, declination, dip, isogonic & agonic lines, meridian. Theodolite surveying: Parts of theodolite, definitions & terms, fundamental lines. Levelling: Definitions, instrument used, methods of levelling. Tacheometric surveying: instrument, systems. Contours: Basic definitions, characteristics of contours, Different methods of contouring. Traverse computations: checks in traverse, latitude & departure. Curves: basic definition, types of curve. Area and volume calculation: different methods.

Advanced Surveying: Electronic Distance Measurements, types. Total Station: component parts, errors. Global Positioning Systems, Remote Sensing, Geographical Information System. Field astronomy: technical terms.

Building Materials and Construction: Brick and Brick Masonry, Stone and Stone Masonry, Paint, Arch and Lintel, Doors and windows, Foundation, Stair, Roof, Timber, Lime, Cement, Floors, Tiles, Plastering and Pointing, DPC, Metals and Alloys, Carpentry and Joinery, Temporary structural treatment for building construction.

Water Resources and Irrigation Engineering: Types and Methods of Irrigation, Water requirement of

crop, Crop season, Classification of crops, Consumptive use, Efficiencies, Duty, Delta, terms in irrigations. Canals: Classification of canals, cross sectional elements of canals. Cross Drainage work, types of CDW. Diversion Head works, Component parts. Dams and classification. Reservoirs and Classification, storage zones of reservoirs, Yield. Spillways, Types, River training works.

Hydrology: Hydrologic cycle, components parts of hydrologic cycle and its measurement. Geologic formations: aquifer, aquitard, aquiclude, aquitard etc.

Water Supply and Sanitary Engineering: Water supply engineering - water treatment method, drinking water standards of various physical, chemical and biologic matters. Sanitary engineering - Types of wastewater, sewage treatment methods, Sewer appurtenances: house drainage and system of plumbing, Sanitary fittings

Estimation and Valuation: Estimation & Costing: Types of estimate, Sanctions, General specifications and terminologies, Methods of Quantity Surveying, Rules and methods of measurements of work, Data Book, Bar bending schedule. Rate analysis and Valuation- Methods of valuation, Life of various building components, General specifications. Building rules and byelaws- Based on KMBR and NBC.

Concrete Technology: Grades of concrete, Types of mix, Proportions in concrete, Minimum grade of concrete, Workability: Factors affecting, Test for workability (Slump, Compaction factor, Vee bee Consistometer)

RCC: Basic concepts of rectangular beams, shear reinforcement, Bond and development length, torsion, One way slab, Two way slabs, Columns: effective length, axially loaded short columns with rectangular ties and helical reinforcement, footing, retaining wall : IS code recommendations.

Steel Structures: Bolted and welded connections, Tension members, Compression members, Beams, Roof trusses, Purlins (basic concepts) : IS code recommendations

Transportation Engineering: Highway Engineering - History of roads, Alignment of highway, Geometric

ric design and construction, Super-elevation, Curves, gradient, Highway materials, Types of pavement, Joints in cement concrete road, failure in pavements, Traffic Engineering. Railway Engineering- Introduction to railway, permanent way, type of rail sections, rail joints, coning of wheels, defects in rail, sleepers and its types, sleeper density, Ballast, Gradient, super elevation, cant deficiency, curves, Rail fixtures and fastenings, Plate laying methods, Railway yards, Triangle, turntable, traverser, buffer stop, points and crossings, Interlocking of signals, railway zones. Docks and harbor Engineering - water transportation systems, types of harbours, layout of harbour, wet dock and dry dock. Airport Engineering - Runway, Taxiway, Apron, hangar, markings in airport, lighting in airport

Bridge Engineering: Introduction –Types, basic components and terms

MECHANICAL ENGINEERING

Metallurgy and Machine tools: Metals and alloys, crystal structures, ferrous alloys, Manufacturing of pig iron, Manufacturing of steel, Non ferrous alloys, Heat treatment process, mechanical properties, Testing and inspection of materials. Measuring instruments, gauges and comparators, welding, soldering and brazing, foundry, bench work and fitting.

Machine Tools: Metal cutting, Chip formation, Single point cutting tool, Tool life, Machinability, Lathe and lathe parts, Drilling machine, Slotting machine, Shaping Machine, Planing machine, Milling machines, broaching machines, Gear manufacture, Jigs and Fixtures, Grinding

Machine Design: Screw threads, Welded joints and piping layout, limits, fits and tolerance, surface roughness, General design considerations, Bolts, nuts and keys, Shafts, Couplings, Bearings, Cams, Governors and flywheels, Belt drives, Gear and Gear trains.

Thermal Engineering: Basic Thermodynamics, Air standard cycles, Fuels and combustion, Testing of IC Engines, Heat transfer, Conduction, convection and radiation, Heat exchanger, Air compressors, Different

systems of IC engines, Principle of refrigeration, Vapour compression refrigeration systems, Refrigeration equipments, refrigerants, Psychometry, Psychometric processes, Air conditioning, Air conditioning systems

