

**FURTHER DETAILS REGARDING MAIN TOPICS OF
PROGRAMME NO. 10/2015 (Item No. 22)**

OVERSEER

**KERALA STATE CASHEW DEVELOPMENT
CORPORATION LIMITED**

(CATEGORY Nos. 431/2014)

PART I

CIVIL ENGINEERING

Module – I

Introduction to surveying Concept of surveying – principles of surveying; purpose of surveying; Plane surveying and geodetic surveying. Classification of surveys – based on instruments, based on nature of field – reconnaissance survey .Units of measurements – linear and angular measurements Chain Surveying-purpose and principle of chain survey-equipments used .Different types of chain and tape-selection of stations – base line – check line – tie line. Different operations in chain Surveying. Ranging – different methods. Chaining and taking offsets- -setting out right angles. chaining on sloping grounds. Errors in ordinary chaining (Brief description only).Obstacles in chaining – methods to overcome obstacles, scaling, Plotting, conventional signs. Plane table survey - Purpose and principles of plane table survey-accessories of plane table – description and use-setting up the plane table -radiation, intersection, traversing, and resection-relative advantage and disadvantages

Compass survey-purpose and principles of compass survey-description and working of prismatic compass - concept of meridian – bearing of a line – True bearing and magnetic bearing. Magnetic dip and declination. Field work in compass survey – booking of field notes. Reduced and whole circle bearings. Calculations of included angles in compass traverse. Sources of errors in compass surveying - local attraction – detection and Correction. Plotting of compass traverse – closing error and adjustments.

Levelling - Purpose of levelling - concept of level surface, datum, reduced level and Bench mark. Types of leveling instruments - dumpy, Y, modern tilting and automatic levels. Component parts of leveling instrument – concept of line of collimation, axis of bubble tube, axis of telescope, vertical axis and Sensitiveness of bubble tube. Types of levelling staff. Field work - Temporary adjustments, form of level book. Reduction of levels by rise and fall method and height of collimation method – comparison -

problems. Errors in levelling – curvature and refraction corrections, distance to visible horizon – problems.

Classification of leveling - fly levelling, profile levelling, cross sectioning, checks levelling, reciprocal levelling and contouring. Contouring - Characteristics – methods of contouring, plotting by interpolation - tracing contour gradient – uses. Marking alignments of road, railway and canal in a contour map. Capacity of reservoirs using contour maps. Longitudinal sectioning and cross sectioning – plotting – working profile for roads. Permanent adjustments of dumpy level.

MODULE-II

Structural building materials Stone–classification–geological, Physical and chemical classification–characteristics of good building stone–varieties of stones–granite–trap–basalt–sand stone–Laterite. Values of load bearing capacity of stones. Quarrying of stones–methods–wedging and blasting–explosives used. Dressing of stones. Clay Products: Bricks: Raw materials used–Composition of brick earth, manufacturing methods (Description only)–IS specifications of bricks–characteristics of good brick used for building purpose. Tiles: Types of tiles–characteristics–uses–Porcelain and glazed tiles Earthenware and stoneware pipes–uses–qualities. Lime: Sources of lime–Classification–methods of manufacturing (Description only)

Cements: Composition, Compounds present, Manufacturing methods–characteristics of cement, Types of cement–Properties of each–characteristics of cement–Tests on cement–Consistency test, fineness test, Sp. gravity test, Setting time test, Soundness test. Puzzolona–definition–Common puzzolonas used as admixtures in cement. Aggregates: Sand: Sources of sand–River sand, Sea sand and pit sand–Limitations of mining of sand from rivers and sea shore–M-sand, alternatives of sand. Coarse aggregates: Materials generally used, requirements of good coarse aggregates, commonly used sizes for different applications. Cement Concrete: Plain concrete–Water cement ratio–Ingredients and proportioning methods–characteristics–preparation–workability–Tests on Cement concrete–Laboratory tests and field tests–Slump test, compaction factor test–Qualities of water used for mixing. Reinforced cement concrete–Qualities of materials–Types of reinforcement used–characteristics of reinforcing material–waterproofing compounds. Mortar: Preparation of lime and cement mortar–Proportions of mortar for various items of work–tests on cement mortar. Timber and wood products: Structural classification–Soft wood and hard wood–defects in timber–seasoning of timber–preservation of timber. Metals: Ferrous metals–Wrought iron, Cast iron, Mild steel–Special steels–High carbon steel, High tensile steel and stainless steel (Properties and uses only)–Non ferrous metals: Aluminum, Copper, Lead, Zinc and Titanium–important alloys–properties and uses.

Paints and Varnishes: Types–Constituents–Preparation–characteristics and application. Plastics: types–characteristics and properties of P V C–uses–Limitations of using plastics. Rubber: Characteristics and properties, uses. Aluminium : Aluminium sections used for building construction–Hand rail and baluster, Doors and windows, Paneling and false ceiling, building façade. Glass–Types–Uses and properties. Glass used for Structural applications. Miscellaneous: Abrasives–Adhesives–asbestos–asphalt–bitumen–cork–Plaster of Paris insulating materials–fibre glass–thermo Colewood products–veneers, ply wood, particle board–fibreboard, hard board, etc.

Masonry: Classification-Stone masonry-Brick masonry-Laterite masonry-composite masonry.Different types of stone masonry-General principles and specifications for stone masonry as per relevant codes.Brick masonry: Different types of bonds for walls, piers and junctions of walls for equal and unequal thickness-English, Flemish (Single and Double Flemish)-Specification for brick masonry as per relevant codes.Hollow block masonry: Types of hollow blocks used in construction and methods of construction-Advantages and Disadvantages with reference to other types of masonry. Solid block masonry and interlocking block masonry.Partition walls-Types-materials-requirements.Modern methods of construction-Framed-Prefabricated-Earthquake resistant

Damp proof courses: Definition of dampness-causes and effects-methods of prevention-surface treatment-internal water proofing courses.Pre stressed concrete: Principle of pre stressing-Types-Internal & External and different methods-pre-tensioning & post tensioning.Form work: Functions-materials used-Requirements of good form work-modern trends in material & technology-slip forms.Scaffolding, Shoring and Under pinning : Definition-purpose and function-Requirements-materials used Plastering and Pointing: Materials and proportion-Functions-general specifications-types

Different components of building from foundation to roof and their functions Foundations: Functions, Classification, Shallow-Deep ,Types-Spread footing-raft-mat-column footing-pile foundation-well foundation.Flooring: Requirements of a good floor-materials used for flooring,Floor finishes-Types-Mosaic, Marble, Granite, Ceramic tiles,Vitrified tiles,Glass, Wooden, and other types of modern floor finishes

Doors and Windows: Positioning of Doors and windows with respect to lighting and ventilation-Types and Size-Special types of doors-Flush, Revolving, and collapsible, Rolling and sliding-Windows-Different types-Ventilator Different types-Fittings for doors and windows.Lintels and sunshades: Types of lintels-Wooden, Stone, brick,RCC and RSJ lintels-Sunshades-Canopy and sun breakers.Archs-Types, terms used.Vertical Transportation: Staircases, Lifts and Escalators-Planning and location-Component parts of staircase and lift-Types of staircase Ceiling: Materials used for Ceiling-False ceiling.Roof: Definition-importance of roofing with respect to climatic conditions-classification-pitched and flat-Couple,couple closed and collar roof.Different types of trusses for pitched roof-wood and steel trusses-roof covering for pitched roof-AC sheets, GI corrugated sheets,Aluminium sheets-PVC sheets-method of arranging and fixing to the battens rafters and purlins-RCC roof-slab with beams-flat and sloped slabs-Flat slab construction-weatherproof course to flat roof.Requirements of good floor finish, Selection of materials Ceiling: Types , Requirements of good ceiling, Selection of materials Stairs and staircases: Location-Types-Standards for stair case as per KBR-Tread , Rise,Going ,Riser,Nosing-Width of stair-Head room-Flight-Landing

MODULE-III

Forces and Moments Definition of force-Conditions of Equilibrium of forces-Resolution of forces-Principles of resolution-Resultant of a number of coplanar forces acting at a point.Moment of force-types of moments-principle of moments (proof not required)-Determination of Reaction of simply supported beams and overhanging beams with point loads and uniformly Distributed loads Centre of Gravity Definition of center of gravity (C.G)-C.G. of plane in the same straight line and those distributed Over a plane-Centroid of plane figures-C.G. of solids.Determination of centroid of compound areas and reminders-C.G. of combination of simple solids Moment of inertia Definition of rectangular

moment of inertia and polar moment of inertia–radius of gyration parallel axis theorem and perpendicular axis theorem M.I of simple sections, rectangle, triangle, circle

(without proof)M.I. of composite areas and remaindersFriction:Static, dynamic and limiting friction–Laws of friction–Angle of friction–coefficient of friction-angle of repose..Equilibrium of a body on inclined rough surface [simple problems].

Simple stresses and strainsStress and strain–types of stresses–Elasticity–Hook’s law–Young’s modulus–stresses and strains in uniform sections of same and composite materialsMechanical properties of materials–Elasticity, stiffness, plasticity, toughness, brittleness, ductility,Malleabilityand hardness–Tensile test on ductile material (mild steel bar) and stress strain curve–Compression test on brittle material (cement concrete) and stress strain curve–limit ofProportionality, elastic limit, yield point–ultimate stress–breaking stress–working stress and factor of safety.Temperature stresses–elongation and contraction due to temperature change–temperature stress when deformation is fully or partially prevented–temperature stress in composite sections.Linear strain and lateral strain–Poisson’s ratio-volumetric strain–Bulk modulus–modulus of rigidity–relationship betweenElastic constants (No proof)–simple problems.

Torsion of circular shaftsTheory of pure torsion–derivation of formula–problems.Power transmitted by circular shafts–problems.Beams and bendingClassification of beams–cantilever, simply supported, fixed, overhanging and continuous.Types of loading–concentrated, uniformly distributed and uniformly varying load.Shear force and bending moment–definition and sign conventions.Calculation of SF and BM forCantilever, simply supported and overhanging beams and sketching ofSF and BM diagrams (for point load, uniformly distributed load, uniformly varying load and combinations of u.d. and point loads)Relation between SF and BM. Maximum BM–point of contra flexure

Module - IV

IC Engines-Definition-Classification- two stroke engines, four stroke engines, working of two stroke engines and four stroke engines with the help of line sketches, comparison between two stroke and four stroke engines, comparison between petrol engine and diesel engines, Function of fly wheel, clutch, gear box, propeller shaft and differential in power transmission. Explain with sketch the working of differential. Briefly explain power transmission of 4 wheel vehicle with line diagram.

The importance of power plants-Introduction-Classification of power plants-working of hydro electric power plant with schematic sketches-Working of Thermal (Steam and Diesel) power plant with schematic sketches-Working of Nuclear power plant with schematic sketches.

Properties, testing and inspection of materials-Metallic and non metallic properties such as :-Mechanical, physical and chemical properties.

Mechanical properties:- strength, hardness, toughness, brittleness, creep, fatigue, stiffness, ductility, malleability, elasticity and plasticity

Physical properties;- density, viscosity, color ,finish, porosity, specific gravity, fusibility, thermal properties such as specific heat, thermal conductivity, thermal resistance and thermal diffusivity, Magnetic properties, Electrical properties such as Resistance, Resistivity ,conductance and conductivity, capacitance - Chemical properties:-Corrosion resistance ,acidity and alkalinity

Measuring Instruments, Gauges:- Classification of measuring Instruments-linear measuring Instruments, Angular measuring Instruments and plane surface measuring Instruments-vernier caliper, micrometer(inside and outside), vernier height gauge.

Classification of gauges-Plug, feeler gauge, standard wire gauge

Carpentry-Carpentry material-timber-structure, classification-soft wood, hard wood-carpentry tools-marking and measuring tools, cutting tools, boring tools, striking tools, holding tools Carpentry processes-marking, sawing, planing and chiselling

Module - V

Importance of Hydraulics-properties of Fluids-density-specific volume-specific gravity –viscosity-kinematics viscosity-Newton’s law of viscosity-types of fluids-compressibility-surface tension-capillarity

Fluid pressure at a point-pressure head-Pascal’s law-absolute, gauge, atmospheric and vacuum pressures-measurement of fluid pressure- piezometer tube-simple manometer-differential manometer-inverted differential manometer-Bourdon’s tube pressure gauge-total pressure-total pressure on immersed surface-horizontal-vertical.

Kinematics and dynamics of flow:-Types of fluid flow-steady and unsteady flow-uniform and non uniform flow-laminar and turbulent flow-compressible and incompressible flow-one, two and three dimensional flow -rate of flow or discharge-equation of continuity of a liquid flow-energy of liquid in motion-potential energy-kinetic energy-pressure energy-total energy- total head of liquid in motion-Bernoulli’s equation-applications of Bernoulli’s equation-venturi meter-Orifice meter-Pitot tube.

Flow through Orifices, Notches, Pipes and Nozzles:- Orifices-types of orifices-vena contracta-coefficient of viscosity-coefficient of discharge-notches-types of notches-Rectangular notches-triangular notch-discharge over notches.

Simple pipes-loss of head in pipes-major energy losses-loss of energy due to friction-Darcy’s formulae for loss of head in pipes-Chezy’s formulae for loss of head in pipes-loss of head due to sudden enlargement-loss of head due to sudden contraction-transmission of power through pipes-water hammer.

Impulse turbines-classification-pelton wheel components-governing of impulse turbines

Reaction turbines-components-difference between Impulse& Reaction turbine -classification of Reaction turbines-discharge-Francis turbine-Kaplan turbine-draft tubes - Centrifugal pump-types of casing-piping system of Centrifugal pump-work done efficiencies-discharge-power required to drive-multi stage pumps-cavitation -priming

Reciprocating pump-types-comparison of Centrifugal pump and reciprocating pump-discharge-slip-power required –Air vessels

Module – VI

Renewable and Non Renewable Resources –Natural and associated problems-(a) Forest resources-Use and over – exploitation , deforestation, Timber extraction, mining ,dams, and their effects on forests and tribal people

(b) Water resources: Use and over utilization of surface and ground water , floods, drought, , conflicts over water, dams-benefits and problems.

(c)Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

(d) food resources: World food problems, change caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

(e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

(f)Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Eco systems: concept of an ecosystem, structure and function of an eco system, producers, Consumers and decomposers.

Ecological succession, food chains, food webs, and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem

(a) Forest ecosystem (b) Grassland ecosystem (c)desert ecosystem (d) Aquastic ecosystems(ponds, streams, lakes rivers, oceans, estuaries)

Environmental pollution

Definition: Causes , effects and control measures of (a)(Air pollution (b) Water pollution (C)Oil pollution (d) Marine pollution (e) Noise pollution (F) Thermal pollution (g) Nuclear hazards

Solid waste management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution .

Environmental hazards& Disasters:-(a) Meaning of Environmental hazards, environmental Disasters and Environmental stress (b)Concept of Environmental Hazards, Environmental stress& Environmental Disasters-Types of Environmental hazards& Disasters: (a) natural (b) man induced hazards &Disasters.- Causes and Environmental Consequences of the following natural hazards-Droughts and Floods-Volcanic Eruption-Earthquakes-Cyclones-Lightning-Tsunami

Principles of management-meaning of management-development of management-Taylor’s scientific management- Functions of management :- (a)Planning:- concept, steps in planning (b)Organising:- concept and process steps, steps in organising

(c)staffing (d)Directing (e)Controlling (d)Decision making- Different types of ownership:-Sole proprietorship, partnership, Private limited company, public limited company, co-operative society-

Organisational - structure:- Definition of organization, different types of organizational structure- line, functional, Line& staff Organisation-Project Management Techniques-application of CPM and PERT- scope of CPM and PERT- commonly used names in CPM:-Operation, post operation, concurrent operation; earliest finish time, latest finish time, critical activities, critical path, event, slack or float, dummy activity-construction and numbering of network diagram- PERT comparison between CPM and PERT- procedure for PERT- calculation of expected time-commonly used terms in PERT, event, activity, successor event, predecessor event, Earliest expected time, Latest allowable time, slack.

The principles of good wage payment system - Importance of good wage plan-types of wages-nominal, real, living ,fair and minimum wages- requirement of good wage payment system-Incentives-definitions, types of incentive plan for direct workers-non financial and semi financial incentives –financial incentive plans-straight piece rate system, straight piece rate with guaranteed minimum wage. differential , piece rate system, Halsey plan, Rowan plan, Gantt plan.-Stores management-store keeping functions-duties of store keeper-store layout-centralized and decentralized store-store records-indent forms-bin card-store ledger.- sales-importance-functions of sales department-sales forecasting.

Electrical Engineering

Module - VII

Network Theorems - Kirchoff' Laws, Super position theorem, Thevenin's theorem, and Norton's theorem. Simple problems using the above theorems Maximum power transfer theorem and Reciprocity theorem - problems.

Absolute and relative permittivity of a medium, Dielectric constant - Laws of electrostatics - Field strength or field intensity - Electric flux density - potential and potential difference, Potential at a point, Potential of a charged sphere – Equipotential surfaces - Potential gradient - Breakdown voltage and dielectric strength - problems. .

Capacitor – Charging and Discharging - capacitance - Capacitance of isolated Sphere - Spherical capacitor and parallel plate capacitor - Variable capacitors – capacitance between two parallel wires - Capacitors in series and parallel - Energy stored in a capacitor - problems.

Magnetism Absolute and relative permeability, field strength, magnetizing force, flux and flux density. Relation between flux density and magnetizing force, B.H. curve Force on a current carrying conductor lying in a magnetic field - Magnetizing force of long straight conductor. Magnetic circuit - Definition of magnetic circuit – magneto motive force, reluctance, Ampere turns, permeance, reluctivity. Comparison of magnetic and electric circuit – calculation of ampere turns – problems.

Electromagnetic induction - Faradays laws of electromagnetic induction - problems , Fleming's right hand rule, Lenz's law , statically and dynamically induced E.M.F. Expression for dynamically and statically induced E.M.F. Self inductance and mutual inductance, Co-efficient of self and mutual induction, co efficient of coupling – Energy stored in magnetic field - problems.

A.C fundamentals - Generation of alternating voltage and current, EMF equation, Different forms of E.M.F equation values of voltage and current. Waveforms and harmonics, Definition of (a) cycle (b) frequency (c) time period (d) amplitude (e) average value (f) R.M.S. Value and instantaneous value

(g) form factor and peak factor (h) phase and phase difference, derivation of r.m.s and average value for sinusoidal waveforms.

Phasor representation of alternating quantities, vector diagrams using R.M.S. Values. Addition and subtraction of alternating quantities by vector method - problems. Phasor Algebra - Mathematical representation of vectors - polar form, Rectangular form, Complex form and trigonometric forms. Addition, subtraction, multiplication & division of alternating quantities in these forms. Series A.C circuits - AC through R L, R C, and R, L C circuits – active, Reactive and Apparent power, Power factor, Resonance in R-L-C series circuits, problems in series circuits (In polar and rectangular form). Parallel A.C circuits - phasor method , solving problems in RL and RC parallel circuit Resonance in parallel circuit

AC bridges – Maxwell's inductance bridges – Anderson bridge – Hay's bridge – capacitance bridge – Schering bridge -

Module - VIII

Power Plants – Introduction - Classification of power plants - Working of Hydro electric power plants - Working of Thermal (Steam and Diesel) power plants - working of Nuclear power plants

Electric current, Potential difference, Power, EMF, Resistance and its laws, Ohms law and series parallel circuit, Electromagnetism, generation of AC and DC supply. Idea of Basic electrical circuit – Electrical Supply and Load and its functioning, Division of voltage and current in a parallel and series circuit - simple problems, Units of power and energy, Solution of DC circuit with Calculation of energy consumption in an installation. Electrical circuit of an installation, Earthing, Lightning protection

Effect of temperature on Resistance - Temperature co-efficient of resistance and problems. Calculation of Resistance of a conductor, Voltage source, current source and its conversion. Dependent and independent source, Linear, non linear circuit, unilateral and bilateral circuit. Passive and active circuit, Voltage and current division in a branch of a DC network. Electric power and energy in D.C. Circuits. Simple problems

Lead Acid Cell, DC Generators and Motors Lead Acid Cell-Construction and materials used – charging – discharging-efficiency and rating – care and maintenance Constructional details and principle of working of D.C. generator – armature reaction –effects of armature reaction - types – based on field connections – difference between generator and motor. Principle of working of D.C. motors – need of starter for D.C. motor – applications of DC motors. Stepper motor - Principles of working, construction and classification, applications.

A.C. 3 phase circuits - star and delta connections - Voltage and current relations - Transformation ratio - expressions for power Transformers - Principles of operations of a single – phase transformer – transformer tests - open circuit and short circuit - losses and efficiency – Methods of cooling transformer. 3-Phase transformer - Autotransformer – principle, rating of transformer – uses and advantage.

A.C. Generators and Motors, Measuring Instruments & Utilization. Construction and working of A.C. generators - classification. Salient pole and turbo types. Principle of working of 3phase induction motor. Types of induction motor – synchronous speed - slip – frequency of rotor current – problems - . Applications. Method of starting of squirrel cage and slip ring induction motors. Principle of working of single phase induction motor – capacitor start type – universal motor – reluctance motor - uses. Measuring Instruments – Moving coil, moving iron – voltmeter and ammeter - dynamometer type wattmeter. Incandescent lamp - Discharge lamp - Fluorescent lamp - mercury vapor lamp and sodium vapor lamp. Effect of shock and burns – procedure to be followed in case of electric shock

PART II: General Knowledge, Current Affairs and Renaissance in Kerala

General Knowledge

Facts about India

Geography of India – Physical features – Climate – Soils – Rivers – Famous sites – etc.

Demography – Economic and social development – Poverty alleviation – Economy and planning – etc.

History of India – Period from 1857 to 1947 – National movement

Facts about Kerala

Geographical Facts – Physical features – Climate – Soils – Rivers – Famous sites – etc.

Renaissance in Kerala

Important Events/Movements/Leaders

Brahmananda Swami Sivayogi, Chattampi Swami, Sree Narayana Guru, Vagbhatananda, Thycaud Ayya, Ayya Vaikundar, Poikayil Yohannan (Kumara Guru), Ayyankali, Pandit Karuppan, Mannathu Padmanabhan, V. T. Bhattathirippad, Dr. Palpu, Kumaranasan, Vakkom Moulavi, Blessed Kuriakose Elias Chavara, Etc.

Current Affairs

Important world, national and regional events related to the political and scientific fields, sports, cinema and literature etc.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.