

**DETAILED SYLLABUS FOR THE POST OF OVERSEER
KERALA STATE CASHEW DEVELOPMENT CORPORATION**

(Category Nos: 68/2021)

(TOTAL MARKS \pm 100)

PART I : Civil Engineering (40 Marks)

- 1) Surveying \pm Principle of surveying, object of surveying, Primary division of surveying Classification of surveying, Different types of chain and tape. The factors involved in selecting stations. The different operations in chain surveying List the errors in chaining List the obstructions in chaining

The principle of plane table surveying The functions of accessories of plane table List the operation to set up and orientation in the plane table surveying. The methods of plane table surveying

List the type of compass. Identify the parts of prismatic compass and their functions. Define bearing. The concept of meridian and types of meridian, The method of booking of field notes. Calculate reduced bearing from whole circle bearings- problem. Calculate the included angles from whole circle bearings. Understand magnetic dip and declination. List the sources in errors in compass surveying.

Define leveling. Types of levelling, Different methods of levelling, Understand the concept of level surface, datum, and horizontal surface, vertical surface and reduced level. The Bench mark and its types Understand the method of reduction of levels-rise and fall method and height of Collimation method \pm Classification of leveling, Contouring, Define the terms used in the theodolite survey List the uses of theodolite. Explain the temporary adjustments of theodolite. List the types of traverse List the different methods of traversing using theodolite. The types of co-ordinates- consecutive and independent co-ordinates calculate the independent co-ordinates. Gales traverse tablen The methods of balancing the traverse- Bowditch's rule and transit rule. The

principle of trigonometric levelling The classification of tacheometry Explain the principle of stadia tacheometry the constants of stadia tachometry Explain the determination of stadia constant. The principle of tangential tachometry Explain the different types of curves- simple curve, compound curve, transition curve and vertical curves Explain transition curve. The elements of simple circular curve The data required to set out circular curve. The different parts of equipments like electronic theodolite, total station and GPS. The uses and advantages of Electronic Theodolite, Total station and GPS Remote sensing and its application in civil engineering field The fundamentals of GPS, receiving, observation and the transformation of GPS results **(10 Marks)**

- 2) Construction Materials and Engineering- 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), kiln and clamp burning ± IS specifications of bricks ± characteristics of good brick used for building purpose.

Tiles: Type of tiles-characteristics-uses-Floor, wall and roofing tiles, Porcelain, vitrified and glazed tiles.

Earthenware and stoneware pipes -uses-qualities

Cement: Composition, Compounds present, manufacturing methods-characteristics of cement, Types of cement-Properties -Tests on cement-Consistency test, fineness test, Sp.gravity test, Setting time test, Soundness test, and field tests, uses of 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, grading of coarse

and fine aggregate. .

Mortar: Preparation of lime and cement mortar-Proportions of mortar for various items of work, tests on cement mortar.

Cement Concrete: Proportioning, ingredients, PCC and RCC, Water cement ratio- effects on strength and workability, characteristics of Concrete and reinforcements-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-preparation of concrete cubes and test on cubes. Chemical admixtures Plasticizers and super plasticizers, demerits of over reinforcement and under reinforcement, importance of proper curing.

Timber and wood products: Structural classification- Soft wood and hard wood, defects in timber, seasoning of timber-preservation of timber-wood products ply wood, MDF,HDF, Veneer.

Metals: Ferrous metals-Wrought iron, Cast iron, Mild steel- -Special steels-High carbon steel, High tensile steel and stainless steel (Properties and uses only)-

Nonferrous metals: Aluminum, Copper, Lead, Zinc and Titanium-important alloys- properties and uses

Masonry: Classification of masonry walls- load bearing, non-load bearing and retaining walls. Stone masonry-Brick masonry-Laterite masonry ± composite masonry. Different types of stone masonry-General principles and specifications for stone masonry as per relevant codes. Rubble masonry, 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 inter locking block masonry. Partition walls-Types- materials-requirements. Modern methods of constructions:- 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. Pre stressed slabs and beams Form work: Functions- materials used ±Requirements of good form work ±modern trends in material & technology- slip forms, pvc forms. Scaffolding, Shoring and Underpinning: Definition ± purpose and function ± Requirements of materials used. Plastering and Pointing: Materials and proportion ±Functions ± general specifications ±types

Building Components: 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 as per relevant codes -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. Arches- Types, terms used. Vertical Transportation: Stairs and staircases: Location ± Types ± Standards for stair case as per KBR ±Tread, Rise, Going, Riser, Nosing ±Width of stair ±Head room ±Flight±Landing ±Hand rails. Lift and escalators- Component parts and requirements as per NBC, ramp, 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, Aluminum 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-

weather proof course to flat roof. Requirements of good floor finish, Selection of materials. Ceiling: Types, Requirements of good ceiling, Selection of materials.

(10 Marks)

- 3) Quantity surveying -quantity surveyor± duties of quantity surveyor-essential requirements of quantity surveyor ± Estimate -types ± detailed estimate , supplementary estimate, revised estimate, annual repair and Maintenance, approximate estimate-types of approximate estimate-problems-Units of measurements for different items as per standard ±sundries- Lump sum- Lead and lift- contingencies unforeseen items-work charged establishment-Earth work computation ±Trapezoidal ± mid section-mean section (trapezoidal) - Prismoidal formula ±computation of earth work from Longitudinal section and Cross section (no transverse slope)- Capacity of reservoir from contour mapDifferent methods of taking out quantities ±Center line method ±long wall short wall method Compute quantities of a compound wall ± steps - doors-windows-ventilatorcost of materials at source and at site ±conveyance charges ± standard data book ±schedule of rates ±Lump sum items ±extra labour ± contractor's profit- conveyance statement for different materials-±schedule of rates labour and materials -Analysis of rates-preparation of standard DATA of CPWD with specification as per CPWD standard- Rules of measurements ±rules regarding tolerance of wastage of materials- general rules for taking measurements as per CPWD standard-abstract of estimate preparation of abstract of estimate
- Detailed estimate preparation for building with gabled roof, building with hipped roof. Building with valley, two storied building (residential and office)
- Abstract of estimate preparation for building with gabled roof, building with hipped roof building with valley, two storied building (residential and office)
- Detailed estimate and abstract of estimate for Septic Tank and soak pit estimate

Detailed Estimate of RCC beam, slab, Column and preparation of bar bending schedule. Detailed Estimate of Aqueduct Detailed specifications for various items of work of Earth work excavation, Foundation concrete, Masonry work, D P C, Form work, R C C, Plastering, Pointing, Flooring, Painting and Polishing, I

RC Specifications for WBM road. Mix seal surface works in road formation. Preparation of Plan, Estimate and other documents for submission

Definition of Valuation:- Purpose-Factors governing valuation-Life of structure-type, location Maintenance -legal control. Scrap value-salvage value-market value-book value-sinking fund annuity and depreciation. Methods of valuation:-Rental method-direct comparison with cost-Based on profit-Development method of valuation- depreciation method. Calculation of depreciation by different methods Land valuation ±Problems

(10 Marks)

4) Irrigation Engineering

Fundamentals of Irrigation and Hydrology: Basic methods of irrigation, Nature and Scope of Irrigation Engineering: Definition of irrigation ±necessity of irrigation ± advantages and disadvantages ± perennial and Inundation irrigation ±flow and lift irrigation ± direct and storage irrigation. Water requirement of crop: a) Principle Crops ± Kharif and Rabi Crops in India & Kerala ± Dry and wet crops ± Crop period b) Duty ± different methods of expressing duty ± base period ± relationship between duty and delta - Factors affecting duty ± requirements for precise statement of duty ± duty figures for principal crops ± Simple problems on duty. Hydrology -Run off and maximum flood discharge of a catchment: a) Rainfall ± Types of rain gauges ± Factors for selecting suitable site for rain gauge station. precautions in setting and maintaining rainfall records ± rainfall cycle ± average annual rainfall of an area ± Methods of estimating average rainfall over a catchment- Thiess's polygon method. b) Catchment basin and catchment area, Characteristics of catchment- good, average, bad ± free catchment, intercepted catchment ± runoff ± factors affecting runoff ± nature of catchment, runoff coefficient ± methods of estimating runoff ± empirical. Formulae .c) River gauging ± importance ± site selection ± open gauge well ± measurement of velocity by surface floats, velocity rods and current meter d) Maximum flood discharge from rainfall records Ryve's and Dicken's formulae, H.F.L marks, Gauge reading.

Diversion Head works: a) Classification of head works ± storage and diversion head works ± their suitability under different conditions. ± suitable site for diversion works ± general layout of diversion works- brief description of

component parts of a weir. b) Barrage and weirs. c) Head Regulator ±scouring sluice ± flood banks and other protective works (only description).d) Percolation ±percolation gradient ± up lift pressure, effect of percolation on irrigation works, up lift pressure and exit velocity ±scour ±protective works ± solid and loose aprons

Storage head works: a. Dams ±types ±selection of site-types of survey for site selection ±Factors influencing in site selection- site investigations ±Describe the terms ±full reservoir level, maximum water level, top bund level, dead storage, live storage, free board. b. Evaporation ± Evaporation losses in reservoirs (only brief description) c. Dams ±rigid and non-rigid dams ±main types ±gravity dams-forces acting on a gravity dam ±failure of gravity dams and remedial measures ± elementary profile ± limiting height of dam ± low dam and high dam ±free board and top width ±sketch practical profiles of low dam ±± drainage gallery ± construction joints and their functions - spill ways (only brief description). d). Earth dams ±situations suitable for earth dams ± types of earth dams ± causes of failure of earth dams and precautions - saturation gradient and (phreatic) line± drainage arrangements of an earth dam. e). Tank sluices ±head wall, tower head type ±regulating arrangements. (Brief explanation and diagram only. Tank surplus works ±necessity ±suitable site ±flush escapes ±surplus weirs .

Irrigation canals and soil erosion: Distribution works. a) Canals ±classification ± typical cross section of canal in cutting, embankment, partial cutting and embankment ± berms ± standard dimensions ± balancing depth of cutting-regime channel, necessity and types of canal lining ± maintenance of canals. (Only in brief). b) Canal regulation ± sluice ± drops ± escapes and their functions, c) Cross drainage works ± necessity ± general description of aqueducts ±super passage, under tunnel ±siphon ±level crossing ±inlet and outlet. (Brief explanation and diagram only) d) Soil erosion ± causes and effects of soil erosion, methods of prevention of soil erosion
(10 Marks)

PART II : Mechanical Engineering (30 Marks)

Module 1: Fluid Mechanics (5 Marks)

Definition of fluid, properties of Fluid, Pascal's Law, Hydrostatic law, Measurement of pressure, Total pressure, center of pressure, Buoyancy, Meta centre, Metacentric height, types of fluid flow, discharge, continuity equation, Euler's equation, Bernoulli's equation, Venturi meter, orifice meter, pitot tube, flow through Orifices, notches and weirs, Reynolds experiments, major and minor losses, Darcy Weisbach equation, Chezy's formula, water hammer, vapour pressure

Module 2: Hydraulic machines: (5 Marks)

Impact of jet, jet Propulsion, Hydraulic turbines such as Pelton turbine, Francis and Kaplan turbines and its various efficiencies, draft tube, uses, different types, Specific speed, unit quantities, Governing of turbines, Centrifugal pumps and Reciprocating pumps, cavitation, effect of cavitation, Slip, positive and negative slips, reason for slip, Indicator diagram

Module 3: Thermodynamics (4 Marks)

Thermodynamic systems, thermodynamic properties, Intensive and extensive properties, path, process like reversible, Cyclic, quasi static, Zeroth law of thermodynamics, Enthalpy, entropy, specific heats, First law, second law, gas laws such as Boyle's law, Charles' law, Avogadro's law, Joule's law, Carnot cycle, Air standard efficiency, Mechanical efficiency, overall efficiency, Otto cycle, Diesel cycle.

Module 4; Thermal Engineering & Power plant Engineering (4 Marks)

Fuels, combustion of fuels, Calorific values, lower calorific values, Upper calorific values, Bomb calorimeter, gas calorimeter, minimum air and excess air required for combustion of fuels, stem, wet, dry and super-heated steam, Rankine cycle, Brayton cycle, steam turbines, Gas turbines, steam nozzles, compounding, velocity, pressure,

and velocity-pressure compounding. Impulse and Reaction turbines , advantages and disadvantages of both

Module 5: Mechanics and Strength of Materials (5 Marks)

Centre of gravity, centroid, Moment of inertia, parallel axis theorem, Perpendicular axis theorem, beams, types of beams and different types of loads acting on the beams
Simple stresses and strains, Hook's law, elastic constants, Factor of safety, linear stress and strain, lateral stress and strain, Poisson's ratio, Thermal stress and strains, composite bar, Mohr's circle, Shear force and bending moments, torsion of shafts, thin and thick cylinders, Columns and struts.

Module 6: Manufacturing process and Production Engineering (2 Marks)

Elementary ideas about various basic workshop practices of Carpentry, foundry, sheet metal, welding, smithy and Fitting and various tools using in each sections
Machine tools like lathe, shaper, plainer, milling, drilling and slotting machines

Module 7: Engineering Drawing and Machine design (3 Marks)

First angle projection method and its symbol, projection of points and line in four quadrants,
construction of various conic sections like ellipse, parabola and hyperbola,
Development of surfaces, section of solids, Isometric and oblique projections.
Design of joints, threaded fasteners, keys, cotters, couplings, transmission system, belt, rope, gear, chain drives, and Open belt and cross belt, length of the belts.
Welded joints and Riveted joints and its strength and various efficiencies

Module 8: I.C Engines and Steam boilers (2 Marks)

Engines, Heat engines, S.I & C.I engines, detonation and knocking, Fuel injection, Air fuel ratio, compression ratio, Octane number, Cetane number, steam boiler, water

tube and fire tube boilers like Cochran and Babcock and Wilcox boiler, modern high pressure boilers like La Mont boiler, Benson boiler Boiler accessories and mountings

PART III : Electrical Engineering (30 Marks)

Module 1 : Basic Electrical Engineering (5marks)

Define voltage, current, resistance \pm Concept of DC circuit-Ohm's law -Kirchhoff's laws. Series, parallel and combination connections of resistors. Define electric power, energy. Resistance, Inductance and Capacitance. Faraday's laws of electromagnetic induction. RLC series circuit

Module 2 : Electrical measuring instruments (4 marks)

Indicating Instruments - Working principle of permanent magnet moving coil, dynamometer type, Rectifier type and moving iron type instruments. Extension of range of DC voltmeter and ammeter. Measurement of Power and Energy. Insulation Megger- earth tester-

Module 3 : Basic Electronics (4 marks)

Semi conductor physics-PN junction Diode \pm Zener diode-Transistors, Amplifiers - Principle of amplification, Oscillators

Module 4 : Fundamentals of ac systems (4 marks)

Single turn generator - voltage equation \pm instantaneous value, peak value, r.m.s, average, form factor, peak factor, waveform \pm cycle - Time period \pm frequency
A.C through pure R, L,C- active, Reactive and Apparent power, Power factor, Resonance in R-L-C series

Module 5 : DC machines (5 marks)

D C generator - Working principle - constructional details \pm Classification - EMF equation \pm DC motor \pm working principle- \pm different types of starters. Applications of DC motors.

Module 6 : AC machines (4 marks)

Transformer operation -construction of single phase transformer. Emf equation.

Transformation ratio. Applications

Three phase induction motor- - construction principle of operation. Applications of motors.

Module 7 : Digital electronics and microprocessors (4 marks)

Digital fundamentals Binary number system-decimal number system - Binary to decimal conversions and vice-versa. Logic gates - Introduction-number systems- one's and two's complement. Universal gates - Arithmetic operations by digital circuits - Fundamentals of Microprocessor - Introduction to Microprocessors Features of 8085 microprocessor

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.

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