DETAILED SYLLABUS FOR THE POST OF WORK SUPERINTENDENT IN SOIL SURVEY AND SOIL CONSERVATION

(CATEGORY NO.385/2024)

I (a) BASIC ENGINEERING DRAWING (8 Marks)

Drawing instruments, equipment and materials

Lettering, dimensioning and scale

Plane geometrical construction

Conic section and projection

(b) UNITS AND MENSURATION (5 Marks)

Units of measurements

Measurement of Perimeter and Area of triangles, polygons and circles

Volume of Solids

(c) AUTOCAD (7 Marks)

Introduction to AutoCAD

Basic commands

Drawing toolbar and modifying toolbar

Plotting and printing

II (a) BUILDING MATERIALS AND CONSTRUCTION (7 Marks)

Stone, Brick, Tiles, Cement, Lime and filler materials

Plane cement Concrete, Reinforced cement concrete

Timber Foundation, Masonary, Roofing, Flooring

Building finishes and services

Temporary structural treatment for building construction

(b) BUILDING DRAWING AND ESTIMATING (7 Marks)

Building rules and byelaws

Estimation, Rules and methods of measurements of work

Rate analysis and valuation

(c) HYDRAULICS AND IRRIGATION (6 Marks)

Terms used in Irrigation

Storage and diversion head works

Reservoir, dam, canals, Cross drainage work

Properties of fluid

Measurement of pressure

Type of Hydraulic energy

III			
(a) Develop surface and and Interpenetration of solid in orthographic projection.	Develop surface	Definition of development..	2
		Need of development in industry.	
		different methods of developing the surfaces.	
		Development of surfaces bounded by plane of revolution intersecting each other.	
		Development of an oblique cone with elliptical base	
		Calculation of developed lengths of geometrical solids.	
	Interpenetration of solid in orthographic projection.	Definition of Intersection & interpenetration curves.	1
		Common method to find out the curve of interpenetration	
		Solution of problems on interpenetration of prism,cones, & pyramids with their axes intersecting at an angle.	
		Intersection of cylinder.	
(b) Different types of fasteners , welds and locking devices	Fasteners	Screw threads, terms , nomenclature.	2
		Types of screw thread, proportion and their uses,	
		Threads as per SP46:2003 conventions.	
		. Types of bolts, nuts and studs,and their proportion, uses.	
	Welds	Description of Welded Joints and their representation.	1
		Indication of Welding Symbol on drawing as per SP-46.	
	Locking Devices	Different types of locking devices.	2
		Different types of machine screws, cap screws, set screws as per specification	
		Different types of foundation bolts and their uses.	
(c) Pipe Joints and riveted joints	Pipe Joints	Description of different pipe joints fitted on pipe.	1
		Expansion joint, loop and other pipe fittings.	
	Riveted joints	Types of rivets, their size proportions and uses	2
		Types of riveted joints, terms and proportions of riveted joints. Conventional representation.	
		Relation between rivet size and thickness of plates and calculation for arrangement of rivets position.	
		Causes of failure of rivetedjoint efficiency of rivetedjoints	
(d) Belt Drive and Gear drive	Belt Drive	Materials of belts, slip and creep, Velocity of belt. Arc of contact.	3
		Simple exercise in calculation of belt speeds, nos. of belts needed in V-belt drive, velocity, pulley ratio etc.	
		Standard pulleys width of pulley face, velocity ratio chain drive.	
	Gear drive	Different types of gears.	2
		Cast gears and machined gears.	
		Knowledge of profile of gears etc.	
(e) Hydraulics and Pneumatics	Hydraulics	Brief description of a typical hydraulic system, components,	2

		Working principle and function of hydraulic jack.	
		Different types of hydraulic actuator.	
		Symbol and working of hydraulic DC valve, non- return valve and throttle valve.	
	Pneumatics	Knowledge of typical pneumatic system.	1
		FRL or air service unit and pneumatic actuator.	
(f) Limits, fit, tolerance.	Limits, fit, tolerance.	Limits, fit, tolerance. Toleranced dimensioning, geometrical tolerance.	3
		Indications of symbols for machining and surface finishes on drawing	
		Production of interchangeable parts, geometrical tolerance.	
		Familiarization with IS: 919, IS:2709.	
(g) Bearings	Types , advantages	Knowledge of bearing to reduce friction.	3

IV

(a) SURVEYING AND LEVELLING

Surveying : Basic principles-purpose of surveying-methods of surveying - linear measurements. Chain surveying : Types of ranging : direct ranging and indirect ranging -Chaining : Types of chains-ranging rod offsets-types and measurement of offsets cross staff-optical square, degree of accuracy in chaining- Triangulation, intersection, traversing, cross staff survey. Compass Surveying-Prismatic compass-Surveyor's compass - whole circle and reduced bearings - true and magnetic bearing - dip and declination - local attraction.

Plane table survey methods-radiation intersection - traversing - Two-point problem and three-point problem. Leveling Types of benchmarks-Rise and fall method-height of collimation method-Contouring Profile surveying-Cross section survey.

Theodolite Surveying-parts of a theodolite measurement of angles.

Tacheometric surveying- stadia system- fixed and movable hair methods-instrument constants tangential tacheometry. Computation of area and volume-Simpson's rule planimeter trapezoidal and prismoidal formula.

Use of Minor instruments - Hand levels - Clinometer. Total station and GPS survey -Remote Sensing, Geographical Information System. Building drawing- planning of building as per National Building Code and KBR - Residential and public buildings - plan, section and elevation of buildings (residential and public) for the given plinth area and requirements. Estimate of a building - estimating principle - methods of estimating separate or individual wall method, centre line method.

Marks: 15

(b) SOIL AND WATER CONSERVATION ENGINEERING

Introduction : Soil erosion-causes, types and agents of soil erosion; water erosion - forms of water erosion, effect of slope, slope length, soil, vegetation, topographical features and rainfall on erosion. Gullies and their classification, stages of gully development; soil loss estimation - universal soil loss equation and modified soil loss equation. Erosion control measures agronomic measures -contour cropping, strip cropping, mulching; mechanical measures - terraces -level and graded broad base terraces, bench terraces. Bunds-contour bunds, graded bunds; gully and ravine reclamation-principles of gully control -vegetative and temporary structures; control measures for stream bank and coastal erosion. Landslides-factors causing it, land slips, Measures for control Land use capability classification; Grassed waterways and their design; Use of Geotextiles in soil and water conservation.

Marks: 5

(c) FARM POWER AND MACHINERY

Agricultural mechanization :- Scope, objectives, limitations.

Status indicators, status of mechanization in Kerala.

Agricultural implements- simple machines- hand tools and manual soil working implements. Field capacities and efficiencies: Calculations-Concept of work, power and energy- Energy efficiency-indicated Horse power-Brake horse power-Drawbar horse power-Mechanical efficiency.

Internal combustion engine- CI & SI engines-types, classification, parts and principles - Principles of two & four stroke cycle engines - Firing orders - valve timing.

Prime movers in agricultural farms- Tractors & power tillers- Types -Selection of tractors and tillers. Tractors and their power units - Fuel supply and carburetion system - Ignition, Cooling, lubrication and governing system. Power transmission- clutch-gear box- differential final drive-brake system. Tyres, cage wheels Power tillers - Power transmission system. Tractor hydraulic system three-point linkage position and draft control. Cost of operation of farm machinery. Field capacities and efficiencies: primary, secondary-tillage operations - puddling implements - rotary tillers-rotavators. Ridgers, bund formers. Implements and machinery for seeding and planting Seed drills-transplanting equipment. Tools and implements for intercultivation operations-manual weeders, power weeders brush cutter. Equipment for plant protection-calibration. Harvesting, threshing and winnowing machinery- reapers and combine harvesters-. Paddy cultivation equipment.

Marks: 10

(d) POST HARVEST ENGINEERING

Post harvest technology of Cereals, Pulses and Oil seeds. Post-harvest losses, importance-basic engineering properties of food materials. Basic psychrometric properties of air-water-vapour mixture. Processing of cereals-rice processing, cleaning and grading, parboiling of paddy, drying, shelling, polishing, by-product utilisation- modern rice mills. Oil seed processing of Coconut, de husking, drying, oil milling pre-treatments, screw press, oil filtration, wet

processing of coconut, value added products, coconut-based beverages- process and equipment, by-product utilisation. Processing of pulses. Dairy engineering -principles and equipment for receiving, cleaning, cream separation, pasteurization, sterilization, homogenization, drying filling and packaging of milk. Common plantation crops in India. Processing of plantation crops: Tea, coffee, cocoa, arecanut, rubber, cashew nut. Processing of spices and condiments: Pepper, cardamom, ginger, vanilla, and turmeric and chilies value added products. Recommended storage conditions of fruits, vegetables and flowers. Harvesting- pre-cooling - cleaning- washing and grading. Handling-storage-refrigerated-Modified and Controlled atmosphere storage-Refrigeration: drying and dehydration- importance -Types of dryers. Processing of important fruits and vegetables-banana, mango, pineapple, tomato and mushrooms. Packing and transportation of fruits, vegetables and flowers.

Marks: 5

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.
