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**Screening Test for the posts of AE(ELECT.), AE(CIVIL), AE (MECH.) & AGRICULTURE ASSISTANT/EQUIVALENT**

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**JAMMU AND KASHMIR PUBLIC SERVICE COMMISSION, JAMMU.**

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**Notice****Dated: .02.2006.**

It is notified for the information of all concerned candidates who have applied for the posts of **Assistant Engineer (Electric), Assistant Engineer (Civil), Assistant Engineer (Mechanical) & Agriculture Assistant/Equivalent** in response to Notification No. 06-PSC of 2005 dated 31.05.2005, 07-PSC of 2005 dated 01.06.2005, 12- PSC of 2005 dated 20.09.2005 & 16-PSC of 2005 dated 13.10.2005 that J&K Public Service Commission is going to conduct a screening test to short list candidates for interview. The syllabus of **Assistant Engineer (Electric), Assistant Engineer (Civil), Assistant Engineer (Mechanical) & Agriculture Assistant/Equivalent** for the screening test is notified for the information of candidates as under: -

**SYLLABUS FOR ASSISTANT ENGINEER (ELECTRIC)**

Primary and secondary cells, Dry accumulators, Solar Cells, Steady state analysis of d.c. and a.c. network, network theorems; network functions, Laplace techniques, transient response; frequency response; three- phase networks; inductively coupled circuits.

Mathematical modelling of dynamic linear systems, transfer functions, block diagrams; stability of control systems.

Electrostatic and magnetostatic field analysis; Maxwell's equations. Wave equations and electromagnetic waves.

Basic methods of measurements, standards, error analysis; indicating instruments, cathode ray oscilloscope, measurement of voltage; current; power resistance, inductance, capacitance, frequency, time and flux, electronic meters.

Vacuum based and Semi conductor devices and analysis of electronic Circuits; single and multistage audio, and radio, small signal and large signal amplifiers: oscillators and feedback amplifiers; wave shaping circuits and time base generators: multi-vibrators and digital circuits; modulation and demodulation circuits, Transmission line at audio, radio and U.H. Frequencies; Wire and Radio communication.

Generation of e.m.f. and torque in rotation machine; motor and generator characteristics of d.c. synchronous and induction machines, equivalent circuits; commutation starters; phaser diagram, losses, regulation, power transformers.

Modelling of transmission lines, steady, state and transient stability, surge phenomena and insulation coordination; protective devices and schemes for power system equipment.

Conversion of a.c. to d.c. and d.c. to a.c. controlled and uncontrolled power, speed

control techniques for drives.

### **SYLLABUS FOR ASSISTANT ENGINEER (CIVIL)**

Engineering Mechanics: Statics; unit and dimensions SI units, vectors, coplanar and non-coplanar force systems, equations of equilibrium, free body diagrams, static friction, virtual work, distributed force systems, first and second moments of area, mass moment of Inertia.

Kinematics and Dynamics: Velocity and acceleration in Cartesian and curvilinear coordinate systems, equations of motion and their integration, principles of conservation of energy and momentum, collision of elastic bodies, rotation of rigid bodies about fixed axis, simple harmonic motion.

Strength of Materials: elastic, isotropic and homogeneous materials, stress and strain, elastic constants, relation among elastic constants, axially loaded determinate and indeterminate members, shear force and bending moment diagrams, theory of simple bending, shear stress distribution, stitched beams.

Deflection of Beams: Macaulay method, Mohr theorems, Conjugate beam method, torsion, torsion of circular shafts, combined bending, torsion and axial thrust, close coiled helical springs Strain Energy, strain energy in direct stress, shear stress, bending and torsion.

Thin and thick cylinders, columns and struts, Euler and Rankine loads, principal stresses and strains in two dimensions- Mohr circle-theories of elastic failure. Structural Analysis; indeterminate beams, propped, fixed and continuous beams, shear force and bending moment diagrams, deflections, three hinged and two hinged arches, rib shortening, temperature effects, influence lines.

Trusses: Method of joints and method of sections, deflections of plane pin jointed trusses.

Rigid Frames: analysis of rigid frames and continuous beams by theorem of three moments, moments distribution method, slope deflection method, Kani method and column analogy method, matrix analysis; Rolling loads and influence lines for beams and pin-jointed girders.

Soil Mechanics: Classification and identification of soils, phase relationships; surface tension and capillary phenomena in soils, laboratory and field determination of coefficient of permeability; seepage forces, flow nets, critical hydraulic gradient, permeability of stratified deposits; Theory of compaction, compaction control, total and effective stresses, pore pressure coefficient, shear strength parameters in terms of total and effective stress, Mohr-Coulomb theory; total and effective stress analysis of soil slopes: active and passive pressures, Rankine and Coulomb theories of earth pressure, pressure, distribution on trench sheeting, retaining walls, sheet pile walls; soil consolidation, Terzaghi one-dimensional theory of consolidation, primary and secondary settlement.

Foundation Engineering: Exploratory program for sub-surface investigations, common types of boring and sampling, field test and their interpretation, water level of observations; Stress distribution beneath loaded areas by Boussinesq and Steinbrenner methods, use of influence charts, contact pressure distribution determination of ultimate bearing capacity by Terzaghi, Skempton and Hansen's methods; allowable bearing pressure beneath footings and rafts; settlement criteria, design aspects of footings and rafts; bearing capacity of piles and pile groups, pile load tests, underreamed piles for swelling soil; Well foundations, conditions of static equilibrium, vibration analysis of single degree freedom system, general considerations for design of machine foundations; earthquake effects on soil foundation systems, liquefaction.

Fluid Mechanics; Fluid properties, fluid statics, forces on plane and curved surfaces. Stability of floating and submerged bodies

Kinematics: Velocity streamlines, continuity equation, accelerations, irrotational and rotational flow, velocity potential and stream functions, flow net, separation and stagnation.

Dynamics: Euler's equation along stream line, energy and momentum equations, Bernoulli's theorem, applications to pipe flow and free surface flows, free and forced vortices.

Dimensional Analysis and similitude Buckingham's Pi theorem, dimensionless, parameters, similarities, undistorted and distorted models.

Boundary layer on a flat plate, drag and lift on bodies.

Laminar and Turbulent flows: Laminar flow through pipe and between parallel plates, transition to turbulent flow, turbulent flow through pipes, friction factor variation, energy loss in expansions, contraction and other non-uniformities, energy grade line and hydraulic grade line, pipe networks, water hammer.

Compressible flow: Isothermal and isentropic flows, velocity of propagation of pressure wave, Mach number, subsonic and supersonic flows, shock waves.

Open channel flow: Uniform and non uniform flows, specific energy and specific force, critical depth, flow in contracting transitions, free overfall, weirs, hydraulic jump, surges, gradually varied flow equation and its integration, surface profiles.

Surveying : General principles; sign conventions, chain surveying, principles of plane table surveying, two point problem, three point problem, compass surveying, traversing; bearings local, attraction, traverse compilations, corrections.

Levelling: Temporary and permanent adjustments; fly- levels, reciprocal levelling, contour levelling; volume computations, refraction and curvature corrections.

Theodolite: Adjustments traversing, heights and distances, tacheometric surveying.

Curve setting by Chain and by theodolite; horizontal and vertical curves.

Triangulation and base-line measurements; Satellite stations, trigonometric levelling, astronomical surveying, celestial co-ordinates, solution of spherical triangles, determination of azimuth, latitude, longitude and time.

Principles of aerial photogrammetry, hydrographic surveying.

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### **SYLLABUS FOR ASSISTANT ENGINEER (MECHANICAL)**

Statics: Simple applications of equilibrium equations.

Dynamics: Simple applications of equations of motion, simple harmonic motion, work energy, power.

Theory of Machines: Simple examples of links and mechanism. Classification of gears, standard gear tooth profiles, Classification of bearing. Function of fly wheel. Types of governors. Statics and dynamic balancing. Simple examples of vibration of bars. Whirling of shafts.

Mechanics of solids: Stress, strain, Hook's Law, elastic moduli, Bending moments and shearing force diagrams for beams. Simple bending and torsion of beams springs, thinwalled cylinders Mechanical properties and material testing.

Manufacturing Science: Mechanics of metal cutting, tool life, economics of machining, cutting tool materials. Basic machining processes, types of machine tools, transfer lines, shearing, drawing, spinning, rolling, forging, extrusion. Different types of casting and welding methods.

Production Management: Method and time study, motion economy and work space design, operation and flow process charts. Product design and cost selection of manufacturing process. Break even analysis, Site selection, plant layout, Materials handling, selection of equipment for job, shop and mass production, Scheduling, despatching routing.

Thermodynamics: Heat, work and temperature, First and second laws of thermodynamics, Carnot, Rankine, Otto and Diesel Cycles.

Fluid Mechanics: Hydrostatics Continuity equation. Bernoulli's theorem. Flow through pipes. Discharge measurement. Laminar and Turbulent flow, concept of boundary layer.

Heat Transfer: Heat transfer by conduction, Convection and Radiation. One dimensional steady state conduction through walls and cylinders. Fins, Concept of thermal boundary layer. Heat transfer, coefficient, Combined heat transfer, coefficient, Heat exchangers.

Energy Conversion: Compression and spark ignition engines, Compressors, fans and blowers. Hydraulic pumps and turbines Thermal turbo machines.

Boiler Flow of steam through nozzles layout of power plants.

Environmental Control Refrigeration cycles, refrigeration equipment- its operation and maintenance, important refrigerants, Psychrometrics comfort, cooling and dehumidification.

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### **SYLLABUS FOR AGRICULTURE ASSISTANT/EQUIVALENT**

Agriculture, its importance in national economy; factors determining agro-ecological zone and geographic distribution of crop plants.

Important crops of India, cultural practices for cereal, pulses, oil- seed, fibre, sugar and tuber crops and the scientific basis for these crops; multiple and relay cropping inter- cropping and mixed cropping.

Soil as a medium of plant growth and its composition, mineral and organic constituents of the soil and their role in crop production; chemical, physical and microbiological properties of the soils. Essential plant nutrients, their functions, occurrence of cycling in soils principles of soil fertility and its evaluation for judicious fertilizer use. Organic manures and bio fertilizers, straight, complex and mixed fertilizers manufactured and marketed in India.

Principles of plant physiology with reference to plant nutrition, absorption, translocation and metabolism of nutrients. Diagnosis of nutrient deficiencies and their amelioration photosynthesis and respiration, growth and development auxins and hormones in plant growth.

Elements of Genetics and plant breeding as applied to improvement of crops; development of plant hybrids and composites, important varieties, hybrids and composites of major crops.

Important fruit and vegetable crops of India, the package of practices and their scientific basis, crop rotations, intercropping, and companion crops, role of fruits and vegetables in human nutrition; post harvest handling and processing of fruits and vegetables.

Serious pests and diseases affecting major crops. Principles of pest control, integrated control of pests and diseases; proper use and maintenance of plant protection equipments.

Principles of economics as applied to agriculture.

Farm planning and resource management for optimal Production. Farming system and, their role in regional economies.

Philosophy objectives and Principles of extension. Extension organisation at the State District and block levels their structure, functions and responsibilities. Methods of Communication, Role of farm organizations in extension service.

Secretary  
J&K Public Service Commission

No. PSC/DR/Syllabus/2006

Dated: 02.2006.