RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF ASSISTANT PROFESSOR IN AGRICULTURE SOIL SCIENCE FOR COLLEGE EDUCATION DEPARTMENT

PAPER – I

Unit 1: Soil Genesis and Classification-

Concept of land, soil and soil science. Composition of earth crust and its relationship with soils; Rocks, minerals and other soil forming materials; Weathering of rocks and minerals; Factors of soil formation; Pedogenic processes and their relationships with soil properties; Soil development; Soil horizons and their nomenclature, subsurface horizons and other diagnostic characteristics, soil moisture and temperature regimes. Assessment of soil profile development by morphological mineralogical and chemical analysis. Concept of Soil individual, Soil classification systems- historical development and modern systems of soil classification with special emphasis on soil taxonomy; application of soil taxonomy.

Unit 2: Soil Physics-

Soil physical constraints affecting crop production. Soil texture-textural classes. Soil structure- classification, soil aggregation and significance, soil consistency, soil crusting, bulk density and particle density of soils and porosity, their significance and manipulation. Soil water- retention and potentials. Soil moisture constants. Movement of soil water - infiltration, percolation, permeability, drainage and methods of determination of soil moisture. Thermal properties of soils, soil temperature, Soil air-composition, gaseous exchange, influence of soil temperature and air on plant growth. Soil erosion by water and wind, their types, effects, mechanics. Runoff - methods of measurement, factors and management, runoff farming. Soil conservation measures.

Unit 3: Soil Fertility-

Essential elements in plant nutrition; Soil fertility & soil productivity; Nutrient cycles in soil; Transformation and transport of nutrients (Macro and micro nutrients) in soil; Manures and fertilizers; Fate and reactions of fertilizers in soils; Chemistry of different fertilizers; Slow release fertilizers and nitrification retarders; Quality control of fertilizers. Soil fertility evaluation – soil testing, plant and tissue tests and biological methods; Common soil test methods for fertilizer recommendation; Soil test-crop response correlations; Integrated nutrient management; Use of isotopic tracers in soil research; Fertility status of major soil groups of India. A concept of soil health and soil quality; causes of deterioration of soil health, chemical, physical and

biological parameters of soil health indicators. Methods to improve soil health for sustainable agriculture production. Organic residue management.

Unit 4: Soil Microbiology-

Soil biota, soil microbial ecology, types of organisms. Soil microbial biomass, microbial interactions, unculturable soil biota. Microbiology and biochemistry of root-soil interface. Phyllosphere. Soil enzymes, origin, activities and importance. Soil characteristics influencing growth and activity of microflora. Microbial transformations of N, P, K, S, Fe and Zn in soil. Biochemical composition and biodegradation of soil organic matter and crop residues. Humus formation. Cycles of important organic nutrients. Biodegradation of pesticides, organic wastes and their use for production of biogas and manures. Bio-fertilizers – definition, classification, specifications, method of production and role in crop production.

Unit 5: Soil Pollution-

Pollution: types, causes, methods of measurement, standards and management. Heavy metal toxicity and soil pollution; Chemical and bio-remediation of contaminated soils; Soil factors in emission of greenhouse gases; Carbon sequestration in mitigating greenhouse effect; Radio-active contamination of soil.

Unit 6: Statistics-

Experimental designs for pot culture and field experiments; Statistical measures of central tendency and dispersion; Correlation and regression; Tests of significance– t and F tests; Computer use in soil research.

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Note: - <u>Pattern of Question Paper</u>

1. Objective type paper
2. Maximum Marks: 75
3. Number of Questions: 150
4. Duration of Paper: Three Hours
5. All questions carry equal marks.
6. Medium of Competitive Exam: Bilingual in English & Hindi
7. There will be Negative Marking.