RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR SCREENING TEST FOR THE POST OF AGRICULTURE RESEARCH OFFICER (AGRICULTURE CHEMISTRY) AGRICULTURE DEPARTMENT

PART-A
General Knowledge of Rajasthan

Unit-I

Historical Rajasthan: Pre and Proto-historical sites of Rajasthan. Important historical centers of early Christian Era. Prominent rulers of major Rajput dynasties of Rajasthan and their achievements & contributions – Guhilas- Sisodiyas, Chauhans, Rathores and Kachchawas.

Emergence of Modern Rajasthan: Agents of Social Awakening in Rajasthan during 19th and 20th Centuries. Political Awakening: role of newspapers and political institutions. Praja Mandal movement in various princely states in 20th century. Integration of Rajasthan.

Art of Rajasthan: Architectural tradition of Rajasthan- temples, forts and palaces from ancient to modern period; Various schools of paintings developed during medieval period; Classical Music and Classical Dance, Folk Music & Instruments; Folk Dances & Drama.

Language & Literature: Dialects of Rajasthani language, Literature of Rajasthani language and Folk literature.

Religious life: Religious communities, Saints and Sects in Rajasthan. Folk Deities of Rajasthan.

Social Life in Rajasthan: Fairs and festivals; Social customs and traditions; attires and ornaments.

Geography of Rajasthan:- Broad physical features- Mountains, Plateaus, Plains & Desert; Major Climatic types; Major rivers and lakes; Major forest types and distribution; Population growth, Density and Distribution; Desertification, Droughts & Floods; Environmental pollution and Ecological concerns. **– 30 Questions**

PART-B
(AGRICULTURE CHEMISTRY)

Unit-I Chemical (elemental) composition of the earth's crust and soils. Elements of equilibrium, thermodynamics, chemical equilibria, electrochemistry, chemical kinetics and Electrode potential. Soil Colloids : Inorganic and organic colloids - origin of charge concept of point of zero charge (PZC), diffuse double layer theories of soil colloids, zeta potential, stability, coagulation/flocculation and peptization of soil colloids : electrometric properties of soil colloids; adsorption and desorption properties of soil colloids; soil organic matter - fractionation of soil organic matter and different fractions, clay organic interactions.

Unit-II Cation and anion exchange process in soil. AEC, CEC; buffering capacity, experimental methods to study ion exchange phenomena and practical implications in plant nutrition. Soil reaction and its influences on nutrient availability. Potassium, phosphate and ammonium fixation in soils. Chemistry of acid soils; active and potential acidity; lime potential; sub-soil acidity. Chemistry and electrochemistry of submerged soils (Redox potential, oxidation-reduction potential), soil pesticide interaction.

Unit-III Structural chemistry, classification of minerals, chemical composition and properties of clay minerals; genesis and transformation of crystalline and non-crystalline clay minerals; amorphous soil constituents and other non-crystalline silicate minerals; clay minerals in Indian soils.

Unit-IV Factors of soil formation, soil forming processes; weathering of rocks and mineral transformation; soil profile; weathering sequences of minerals with special reference to Indian soils. Concept of soil individual; soil classification system-historical developments and modern system of soil classification with special emphasis on soil taxonomy; soil classification and soil maps.

Unit-V Soil survey and its types; soil survey techniques, soil survey interpretations, soil mapping, mapping units, techniques for generation of soil maps. Landform - major soil groups of India with special reference to Rajasthan, land capability classification and land irrigability classification, land evaluation. Remote sensing and GIS techniques of soil and water and crop studies.

Unit-VI Soil physical properties : soil texture, structure, bulk density, particle density, aggregates, soil consistency, soil colour, soil air and soil temperature. Influence of soil temperature and air on plant growth; soil moisture: classification, constants, energy relationship, movement in saturated and unsaturated condition and management.

Unit-VII Soil fertility and soil productivity; nutrient sources - fertilizers and manures, essential plant nutrients - functions and deficiency symptoms. Sources; forms, immobilization and mineralization of N,P,K and S. Micronutrients; critical limits in soil and plants; factor effecting their availability and correction of their deficiencies in plants, role of chelates in nutrient availability. Manufacturing processes for different fertilizers using various raw materials, characteristics and nutrient contents.

Unit-VIII Principles of pH meter, EC meter, colorimeter and flame photometer. Common soil test methods for fertilizer recommendations; quantity intensity relationships; soil test crop response correlations and response functions. Fertiliser use efficiency; fertilizer recommendations - usefulness and limitations; site-specific nutrient management, plant need based nutrient management; integrated nutrient management, soil fertility evaluation - knowledge of conduct of field trails/experiments, soil health, indicators for determining soil health, soil quality management and sustainability.

Unit-IX Soil biota, microbiology and biochemistry of root-soil interface, phyllosphere, rhizosphere, soil microbial biomass (C, N and P), soil enzymes, microbial transformation of nitrogen, phosphorus, sulphur, iron and manganese in soil, biochemical and biodegradation of soil organic matter. Soil organic matter and humus, fractions, structure, formation, C:N ratio, recycling of agricultural and industrial wastes, biological nitrogen fixation and bio-fertilizers. Chemical composition of FYM, Vermicompost, poultry manure and common organic manures.

Unit-X Area, distribution and management of salt affected soils and poor quality waters, acid soils, acid sulphate soils, highly and slowly permeable soils. Soil erosion, extent, type and effects, soil conservation techniques, water harvesting techniques and watershed management, remote sensing for soil and watershed management.

Unit-XI Soil, water and air pollution problems associated with agriculture, nature and extent. Remediation/amelioration of contaminated soil and water.

Unit-XII Preparation of solutions for standard curves, analytical reagents, qualitative reagents, indicators and standard solutions for acid-base. Oxidation-reduction and complexometric titration.

Unit-XIII Determination of nutrient potentials and potential buffering capacities of soils for phosphorus and potassium, estimation of phosphorus, ammonium and potassium fixation capacities of soils. Electrochemical titration of clays; determination of cation and anion exchange capacities of soils, estimation of

exchangeable cations, estimations of root cation exchange capacity. Analysis of soil and plant samples for essential nutrients.

Unit-XIV Radioactivity and units, radioisotopes- properties and decay principles, nature and properties of nuclear radiations. Principles and use of radiation monitoring instruments. GM- Counter, solid and liquid scintillation counters. Neutron moisture meter, mass- spectrometry, auto- radiography. Dosages of radiation exposure, radiation safety regulatory aspects.

-120 Questions

*****

Pattern of Question Papers:

1. Objective Type Paper
2. Maximum Marks: 150
3. Number of Questions: 150
4. Duration of Paper: 2:30 Hours
5. All Questions carry equal marks
6. Medium of Screening Test: Bilingual in English & Hindi
7. There will be **Negative Marking.**

(For every wrong answer, one-third of marks prescribed for that particular question will be deducted).

*****