

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS OF COMPETITIVE EXAMINATION FOR THE
POST OF ASSISTANT AGRICULTURE ENGINEER
(AGRICULTURE DEPARTMENT)

AGRICULTURE ENGINEERING

1. Surveying, Levelling and Land Development:

Linear Measurements, different surveying devices and methods, Total Station Survey, land grading and levelling, contouring and terracing, earth work estimation.

2. Soil and Water Conservation:

Precipitation, hydrologic cycle, point rainfall analysis, frequency analysis. Watershed: definition and concept, agricultural watersheds, prediction of peak runoff, factors affecting runoff, hydrograph, concepts of unit and instantaneous hydrographs. Erosion-type and factors associated with erosion, assessment of actual annual soil loss by erosion and its impact on agricultural production and productivity. Erosion control measures on various classes of lands i.e. contour cultivation, strip cropping, terracing, afforestation, pastures. Role of vegetation in soil and water conservation, grassed water way and design. Integrated Watershed Development Program (IWDP) of Rajasthan, Design of gully control measures including permanent structures i.e. chute spillway, drop spillway, drop inlet spillway, retards and stream bank erosion, mechanics of wind and water erosion, Desert Development Program (DDP) wind erosion control, water harvesting structures i.e. Khadin, Tanka, Nadi and Anicut. Activities of Indian Institute of Soil and Water Conservation Research and Training, Central Arid Zone Research Institute and Regional Remote Sensing Center of Rajasthan.

3. Irrigation and Drainage:

Soil-Water- Plant relationship, water requirements of different crops and irrigation scheduling, direct and indirect methods of soil moisture measurements, measurements of irrigation water. Water conveyance and control, design of field channels. Design of irrigation methods, irrigation efficiencies. Drainage: Benefits of drainage, surface drainage, drainage of flat and slopping lands. Design and layout of surface and sub surface drains, depth and spacing of drains and drainage outlets, installation of drains and drainage wells. Rajasthan Agricultural Drainage Program (RAJAD), vertical drainage and bio drainage. Pumps: Construction and performance characteristics, selection, installation, working principle and maintenance of centrifugal pump, turbine pump, submersible pump, propellers, jet and air lift pumps. Water Resources Development and Management: Water resources of Rajasthan, surface water, ground water, canal irrigation, Command Area Development (CAD), On Farm Development (OFD) works, aquifer parameters, hydraulics of wells, steady and unsteady flow, well log, construction of wells, well development.

4. Farm Power and Machinery:

Classification of Internal Combustion (IC) engines, engine terminology, Otto, diesel & dual cycle, engine components. Fuels properties & fuel supply system, Lubricants & lubrication system, cooling system, governing system. Types of tractors, clutch & brakes, power transmission system, hydraulic system, steering system and three-point linkages. Traction theory, mechanics of tractor chassis, C.G. determination, tyres and selection of tractors. Farm Machinery: Scope of farm mechanization, Sub Mission on Agricultural Mechanization (SMAM), Custom Hiring Centers (CHC) in Rajasthan. Tillage and its objectives, primary and secondary tillage equipment & rotary tillers, ploughing methods. Sowing & planting methods & equipment and their calibration, interculture operation and

weeders, Plant protection methods, nozzles & spray pattern, selection and calibration of sprayers and dusters, Principles, selection and operation of forage, grains and root crop harvesting machinery. Threshing methods and threshers, performance of threshing machinery.

Types of farm implements, measurement of draft, field capacity, field efficiency, and power requirement. Cost analysis of operations of farm power & equipment's. Simple numerical problems on engines, tractors and farm machinery

5. Agricultural Processing:

Importance and development of food processing in Rajasthan, Food Processing Policy of Rajasthan, Material handling equipment. Separation equipment-based on size, shape and surface characteristics. Heating and cooling of food products, mode of heat transfer and types of heat exchangers. Psychometric chart and its application in drying. EMC and its determination, Principles of drying, drying equipment, water activity. Types of evaporators, steam economy. Refrigeration and cooling load calculation. Various size reduction machinery and size reduction theories and milling process for Rice, Maize, Wheat, Oil seeds and Pulses. Parboiling of wheat and paddy. Processing of millets and seed spice crops grown in Rajasthan. Grains storage structures, theory and their design requirement. Principles of food preservation and thermal processing.

6. Farm Electrification and Rural Housing:

Selection, Installation and general care of electric motors and starters on farms, Types of wiring, selection of wire sizes based on BIS and rural electrification program in Rajasthan. Rural Housing: Building materials and their properties, Design of Beams, Slabs, Columns and foundations. Planning and design of rural houses, dairy barn & poultry layout, village roads, drainage system, waste disposal, sanitary structures, materials and cost estimation in construction.

7. Renewable Energy:

Renewable Energy: Importance and Development of Renewable Energy Sources in Rajasthan, Solar Radiation its measurement, solar energy conversion process and devices i.e. solar cooker, solar water heater, solar dryer, solar refrigeration and air conditioner etc. Solar cells and photovoltaic (PV) system, Bio energy production, conversion and utilization. Biogas technology and mechanism, types & design of biogas plant, slurry utilization. Biomass conversion to produce solid, liquid and gaseous fuels i.e. gasifiers, briquettes, ethanol, biodiesel and cook stoves, Basics of wind energy conversion process, types of windmills, wind mills for water pumping and electricity generation systems.

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 Competitive Examination: English
7. There will be Negative Marking