

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

**SCHEME & SYLLABUS FOR THE POST OF ASSISTANT
CONSERVATOR FOREST & FOREST RANGE OFFICER GRADE Ist
COMPETITIVE EXAMINATION, 2018
FOREST DEPARTMENT**

OPTIONAL SUBJECT - AGRICULTURAL ENGINEERING

1. Soil and Water Conservation: - Forms of Precipitation, hydrologic cycle, Hydrologic processes - interception, infiltration, frequency analysis of point rain fall, prediction of peak rate of runoff and runoff yield, factors affecting runoff, stage discharge rating curve. Hydrograph, concepts of unit hydrographs. Erosion-type, affecting factors, damages 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, bunding and terracing, afforestation, pastures etc. Role of vegetation in soil and water conservation, grassed waterway and its design. Design of gully control measures including permanent structures i.e. chute spillway, drop spillway, drop inlet spillway, retards and stream bank erosion, flood routing, design flood and computation of probable flood. Mechanics of wind and water erosion, wind erosion control measures.

2. Irrigation – Soil-Water- Plant relationship, permeability, infiltration, percolation, water requirements of crops and irrigation scheduling, concept of evapotranspiration, direct and indirect methods of soil moisture measurements. Measurements of irrigation water-Orifice, Weirs, Notches, Parshall flumes, H-flumes etc. Water conveyance and control, design and lining of irrigation field channels and canals, Most economical channel cross section. Underground pipe line structures and their design. Irrigation methods, their hydraulics and design viz – Border, Furrow, Check basin, Drip and Sprinklers methods, concepts of irrigation efficiencies. Pumps - Different types of pumps, performance characteristics, selection, installation, working principle and maintenance of centrifugal pump, submersible Pump, air lift pumps and hydraulic ram.

3. Drainage : Benefits of drainage, hydraulic conductivity, drainable porosity, drainage coefficient. Surface drainage, drainage of flat and sloppy lands. Design of open ditches, their alignment and construction. Design and layout of sub surface drains, depth and spacing of drains and drainage outlets, installation of drains and drainage wells, drainage of salt affected areas.

4. Water Resources Development and Management: Water resources of India, Surface water, Ground water, development of irrigation potential, Canal irrigation, Command area development, On farm development works, aquifer types and parameters, Hydraulics of wells, steady and unsteady flow, well log, construction of wells, Design of well screen, well development.

5. Watershed Planning and Management : Watershed - Definition, Introduction and characteristics, Geomorphology of watersheds - Linear, aerial and relief aspects of watersheds. water harvesting - principles and importance, water harvesting techniques and structures - khadin, tanka, nadi, anicut, farm ponds etc.

Watershed Management - Concept, Objectives, factors affecting watershed, watershed planning based on land capabilities classes, prioritization of watersheds. Watershed management work plan.

Surveying, Leveling and Land Development - different surveying devices and methods, linear measurements, land grading and levelling, earth work estimation, Land Development Budgeting, earth moving machinery.

6. Farm Power – Sources of farm power, Classification of Internal combustion (IC) engines terminology, Otto, Diesel cycle, basic IC engine components and functions, fuels and fuel supply system, lubrication system. Cooling system and governing system. Types of tractors, Transmission system – clutch, gearbox, brakes, PTO, differential. Mechanics of tractor chassis, principles of traction, steering system, hydraulic system and selection of tractors.

7. Farm Machinery : Farm mechanisation, tillage and tillage implements, types of hitching systems. Sowing and planting equipment and their calibration, Precision planting. Types of sprayers & dusters and its calibration. Selection and operation and principles of harvesting and threshing machines, reapers, combines and thresher. Cost analysis of farm equipment and related numerical problems.

8. Agricultural Processing : Various size reduction machinery and energy requirement. Material handling equipment. Separation equipment-based on size shape and surface characteristics. Heating and Cooling of food products, mode of heat transfer, different types of heat exchangers. Psychometric chart and its application in drying EMC and its determination, Principles of drying and drying equipments, types of evaporators, single and multiple effect evaporators. Refrigeration load calculation, various milling process for Rice, Maize, Wheat and Pulses. Parboiling of wheat and paddy. Storage structures for grains and their design. Principles of food preservation and thermal processing.

9. Farm electrification and Machine :- AC-DC Machines, DOL starter, Transformer, 3-phase Induction Motors and Alternators, Transmission and distribution of electricity. Selection, Installation & care of electric motors on farms. Selection and types of wiring based on Indian Standards and design of wiring systems. Rural electrification programmes.

10. Renewable Energy : Solar Radiation – its measurement, solar thermal devices and gadgets i.e. solar cooker, solar water heater, solar dryer, solar refrigeration and air conditioning etc. Solar photovoltaic devices i.e. solar lantern, street light, power pack. Bio energy conversion, production and utilization, Biogas – type, classification and design of biogas plants. Biomass gasification and gasifier alcoholic fermentation (Ethanol and Methanol Production), wind energy conversion process i.e., water pumping, wind mills and aero generator.

Note :- **Pattern of Question Paper**

- 1. Objective type paper**
- 2. Maximum Marks : 200**
- 3. Number of Questions : 120**
- 4. Duration of Paper : Three Hours**
- 5. All questions carry equal marks.**
- 6. There will be Negative Marking.**