Rajasthan Public Service Commission, Ajmer

SYLLABI OF THE PAPER/SUBJECTS PRESCRIBED FOR THE MAIN EXAMINATION

OPTIONAL SUBJECT

AGRICULTURE ENGINEERING PAPER-I (Code No.02)

Soil and Water Conservation :- Forms of precipitation, Hydrologic cycle, Point rainfall analysis, frequency analysis. Water shed-definition and concept, agricultural Watersheds, prediction of peak runoff, factors affecting runoff, Hydrograph, Concepts of unit and instantaneous 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, terracing, afforestation, pastures etc. A critical analysis of the role of vegetation in soil and water conservation, grassed water way 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, flood amelioration through soil and water management in upstream zone, mechanics of wind and water erosion, wind erosion control, water harvesting structures i.e. Khadin, Tanka, Nada and Anicut.

Irrigation-Soil-Water-Plant relationship, permeability, Infiltration, Percolation, water requirements of crops and irrigation scheduling, 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 of field channels and Canals, Lacey and Kennedy theories, Most economical channel cross section. Selection of underground pipe line structures and their design, irrigation methods, their hydraulics and design viz-Border, Furrow, Flood, Drip and sprinklers methods, concepts in irrigation efficiencies.

Drainage :- Benefits of drainage, Hydraulic conductivity, Drainable porosity, Drainage Coefficient. Surface drainage, Drainage o flat and slopping 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 wells, drainage of salt affected areas.

Pumps :- Design, Construction, Performance characteristics, selection, installation, working principle and maintenance of

Reciprocating Pump, Centrifugal Pump, Turbine Pump, Submersible Pump, Propellers, Jet and air left pumps and hydraulic ram.

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, acquifier parameters, Hydraulics of wells, steady and unsteady flow, well log, construction of wells, Design of well screen, well development.

Fluid Mechanics :- Fluid properties, units and dimensions, mass, momentum and energy conservation principles, Navier stoke equation, Vorticity-flow of fluids in pipes and channels, Friction factor, turbulence, instruments, and measurement systems.

Surveying, Leveling and Land Development :- Linear measurements, different surveying devices and methods, land grading and leveling, contouring and terracing, each work estimation, Land Development Budgeting, earth moving machinery and theodelite.

AGRICULTURE ENGINEERING PAPER-II (Code No.02)

Agricultural Processing :- Various size reduction machinery and energy requirement. Material Handing Equipment, Separation equipment-based on size shape and surface characteristics, Heating and Cooling of food products, mode of heat transfer, different types of heat exchanges, Psychrometry 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-Rice, maize, wheat, and pulse milling, Parboiling of wheat and paddy. Storage of grains and their design. Principles of food preservation and thermal processing.

Farm Electrification and machine :- AC-DC Machines, DOL starter, Transformer, 3-phase Induction Motors and Alternators, Transmission and distribution of electricity. Selection, Installation and general cares of electric motors on farms, selection of wire sizes based on Indian standards. Types of wiring and design of wiring systems, Rural electrification.

Farm Power :- Classification of Internal combustion (IC) engines terminology, Otto diesel cycle, engine components, Fuel supply system, Lubrication system. Cooling system and Governing system.

Types of Tractors, Brakes, Power Transmission system, Differential, Mechanics of tractor chassis, Steering system, Hydraulic system and selection of tractors.

Rural Housing :- Building materials and their properties, Design of Beams, Slabs, Columns and foundations, Planning and design of Rural

houses, Farm Roads, Village drainage system, waste disposal and sanitary structures, material and cost estimation in construction. Integrated Rural energy planning and development.

Farm Machinery :- Types of hitching systems and hydraulic depth and draft control Selection of sowing and planting equipment and their calibration, Precision planting. Selection and calibration of Sprayers and Dusters. Selection and operation principles of Harvesting and threshing machines. Cost analysis of farm equipment and related numerical problems.

Renewable Energy :- Solar Radiation-its measurement, solar thermal devices and gadgets i.e. solar cooper, solar water heater, solar dryer, solar refrigeration and Air conditions etc. Solar Photovoltaic devices i.e. solar lantern, street light, power pack. Bio energy-production, conversion and utilization route, Biogas-type classification and design of Biogas Plant. Biomass gasification, Alcoholic fermentation (Ethanol and Methanol Production) wind energy conversion process i.e., water pumping, wind mills, and Aero generator. Fuel cell and other chemical sources of energy.

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