Syllabus for Bihar Agriculture Service Category-2 (Agri. Engg.)
Paper-1

Velocity distribution in fluid flow, friction factor, Reynolds number relationship, Bernoulli's equation, fluid flow measurement.

Hydraulic machines, Engineering properties of Soil, Soil hydraulics stress distribution, compressibility, Active and passive earth pressure , Stability of slope , bearing capacity of soils, foundation.

Impact of irrigation on human environment, measurement of irrigation water, weirs, notches, flumes & orifices. Design of irrigation field channels & lining, water requirement of crops, soil-water movement and constants, depth, frequency and efficiencies of irrigation, surface irrigation methods :- their merits and demerits.

Objectives of drainage, familiarization with the drainage problems of the state, pumps characteristic and selection of pumps drainage coefficient, hydraulic conductivity, surface and subsurface and subsurface drainage systems, mole drains, interceptor drains and outlets, Economic aspects of drainage.

Occurrence of Ground water, surface & subsurface flow of water, ground water movement, recharge wells, Well drilling & construction methods, selection & installation of well screen, gravel pack, development and completion of water wells, tube well testing procedure .

Land capability classification, Land evaluation, Land use planning, and cost estimation of earth moving machinery, reclamation of problem areas, saline alkali, Sodic and Water logged soils, planning and design of Irrigation & drainage systems, Conjunctive use of surface and sub surface water resources.

Chain Surveying, Plain table surveying, levels & levelling, Theodolite traversing, Contour & Contouring, measurement of area & volumes.

Types of loads and stresses, shear distribution, analysis of forces and design of trusses and beams. Common engineering materials and their physical and engineering properties.

Hydrologic cycle, Rainfall and its measurement, estimation of infiltration, evaporation and evapo-transpiration, factors affecting runoff & its measurement. Rating curve, cook's method, SCS method, Curve number, hydrograph,, base flow separation. Flood routing , introduction to watershed management & planning.

Analysis of rain fall data for dry land farming, rainfall probability Soil moisture stress, climate yield relationship, methods of reducing moisture loss from soil.

Principles and mechanics of erosion. Measurement & estimation of soil loss, agronomical & mechanical/engineering measure to control erosion, diversion ditches, vegetative waterways, outlast and their designs, terraces, gully control structures – drop, drop inlet & chute spillways, grassed waterways, introduction to water harvesting techniques. Hydraulic jump and its application, H-flume, weirs and parshall flume. functional requirement of erosion control structures models. Planning, design and layout of soil & water Conservation structures.

10/10/2024

Syllabus for Bihar Agriculture Service Category-2 (Agri. Engg.) Paper-2

Force systems, movement of Inertia, free body diagram and equilibrium of forces. Thermodynamic properties, systems, gas laws, thermodynamic laws, cycle.

Sources of farm power, Conventional and non-conventional energy sources, Renewable energy sources-solar and wind energy & its application. Baling of biomass and briquetting methods. Different R.E. devices- gasifiers & biogas plant. Classification of tractors & I.C. engines, engine systems, construction, components & I.C. engine fuels. Tractor systems & controls – study of transmission, hydraulic, steering systems, tractor power outlets, tractor chasis mechanics and design. Repair and maintenance of Engine & tractor.

Knowledge of different types of welding, shaping and milling techniques and equipments.

Objectives of farm mechanization, classification, principles and selection of farm machines. Primary and secondary tillage equipments. Force acting on tillage tools and draft measurement. Sowing, planting, transplanting equipments-their calibration and adjustments. Crop harvesting machinery. Weed Control and plant protection equipments :- Sprayers & dusters. Threshing machines and various types of threshers. Selection & management of farm machines for optimum performance. Principles of fruit harvesting tools & machines. Testing of Farm machines. Farm machines management

Factory acts, factory location and layout, production procedure, quality control and standardisation.

Importance of food processing and methods, study of different physical, rheological and thermal properties of foods & their importance in designing processing machines. PHT /Processing of cereals, pulses, oilseeds. Principal of size reduction: power requirement, (Rittinger's Kick's and Boud's equation), size reduction methods and machines. Theory of separation – different types of separators, mixing & material handling devices, design consideration, capacity & power requirements.

Grain moisture and its measurement, Grain drying theory & methods, different types of grain dryers, drum dryers, freeze dryers, tray dryers, performance & methods, different types of spoilage and its causes, storage losses, moisture & temperature changes in storage of grain, cooling, refrigeration load calculations. Functional requirement of grain storage structure, grain pressure theories. Traditional storage structure, bag and bulk storage systems, design of silo. Controlled atmosphere & modified atmosphere storage for fruits and vegetables.

Steady state heat transfer in conduction, convection and radiation. Estimation of heat transfer coefficients for flow on simple surface. Design of double pipe tubular and plate heat exchanger, effectiveness of heat exchangers.

Working principles of equipment for pasteurization, homogenization, sterilization, filling and packing of milk, design of double pipe and plate heat exchangers. Different methods of food preserved, proximate analysis of food products. Food dehydration & freezing. Food quality concept & control, Food laws & regulations, Food standards (BIS, AGMARK, PEA, FPO, CAC, GMP, HACCP& ISO series.)

Meaning and phases of machine design, design considerations. Farm stead planning, farm roads, fences, and gates, BIS standards for dairy., poultry and other farm structures, design, construction and cost estimation of farm structures .