

AGRICULTURAL ENGINEERING

1. FLUID MECHANICS:

Definition and properties of fluids. Units of measurement. Fluid statics. Types of fluid flow-streamlines, pathlines, streaklines, stream functions and flow net. Linear and angular momentum. Continuity equation, Bernoulli's equation and Euler's equation of motion. Dimensional analysis and similitude. Laminar and turbulent flow. General equation for head loss in pipes. Energy losses through pipe fittings. Measurement of discharge through pipes and open channel.

2. SURVEYING AND LEVELING:

Principles and methods of chain surveying, compass surveying, plane table surveying. Care in handling and adjustment of instruments. Levelling, contouring. Calculation of areas and volumes. Theodolite surveying, traversing and adjustment of errors.

3. CROP PRODUCTION TECHNOLOGY:

Climatic zones of West Bengal and its characteristics. Characteristics of crop seasons. Agronomic classification of crops and its distribution. Tillage, seed and sowing, interculture operation, harvesting, processing, storage and protection of crops. Concept of yields and yields components. Crop growth rate, seed production, processing and testing. Soil forming rocks and minerals-origin, classification and composition. Weathering of rocks and minerals. Soil forming process. Factors of soil formation. Soil Profile, soil as a medium of plant growth. Soil texture and structure, physical and chemical properties. Soil water composition, classification, soil moisture constant and functions.

4. SOIL AND WATER CONSERVATION ENGINEERING:

Mechanics of erosion. Estimation of soil loss. Wind erosion control. Biological control of erosion. Stream bank erosion. Design of grassed water way, graded and contour bunds, terraces. Permanent gully control structure-drop, drop inlet and chute spillways. Watershed management.

5. SOIL MECHANICS:

Index properties of soil-void ratio, porosity, densities, water content, particle size distribution, consistency limits and permeability. Stress under surface loading. Shear strength of soil. Compaction and consolidation. Earth pressure and retaining wall. Seepage through earth dam-basic parabola. Stability of slopes. Shallow foundation.

6. WATERSHED HYDROLOGY:

Hydrologic cycle, precipitations – forms, rainfall measurement, mass curve, frequency analysis of point rainfall, plotting position, infiltration, evapotranspiration – estimation and measurement, stream number, stream length. Runoff – factors affecting, measurement and estimation. Hydrograph – components, base flow separation. Unit hydrograph, synthetic unit hydrograph, flood routing.

7. GROUND WATER HYDROLOGY:

Geologic formations. Types of aquifers and wells. Ground water measurement, Hydraulics of wells. Aquifer properties. Steady and unsteady flow through confined and unconfined aquifers. Determination of aquifer properties. Theis method, Jacob's method. Well in interference.

8. FARM ENGINES AND TRACTORS:

Power availability on the farms from animate and inanimate sources of energy – their capacities and efficiencies; Tractor engine components and their constructions; Valve and valve timing mechanism; Working principles of engine systems – fuel and air supply, cooling, lubrication, ignition starting and electrical systems; Engine governing; Transmission system of wheel and track type tractors – clutch, brake, gearbox, differential, PTO, belt pulley, drawbar and final drive mechanism; Power tillers and small engines for farm operations; performance and cost analysis of farm tractors and power tillers.

9. TUBEWELLS AND WELL TECHNOLOGY:

Type of various tubewells; design and construction of wells; selection and placement of strainers; construction materials for wells and strainers; pipe joining methods; tubewell development by compressor and over pumping method; design of suitable pump of various types for development in the tubewell for lifting clear water; pump characteristic and selection of pump.

10. IRRIGATION AND DRAINAGE:

Irrigation and drainage for sustained farm production. Soil-water-plant relationship. Irrigation water requirements. Evapotranspiration methods. Irrigation scheduling. Design of field channels. Traditional irrigation methods-border, basin, furrow. Design of sprinkler and drip irrigation systems. Drainage materials. Design of surface and sub-surface drainage systems.

11. BUILDING MATERIALS AND STRUCTURES:

Kinds of building materials and their properties. Timber, brickwork and R.C. construction. Design of R.C.C. beams, column footings, roof slabs and roof trusses. Design of storage structures. Estimation of building, roads and sheds. PERT and CPM.