

## SECTION - A

**1. Soil and Water Conservation Engineering :** Hydrologic cycle rainfall and runoff-factors effecting them and their measurements, stream gauging-evaluation of runoff from rainfall. Infiltration, evaporation, hydrograph, flood routing Definition and scope of soil conservation ; Mechanics and type of erosion, their causes. Erosion control measure - Biological and engineering. Basic open channel hydraulic. Design of soil conservation structure-terraces, bunds, outlets, and grassed waterways. Gully control structure such as chute, drop and drop inlet spillways. Stream bank erosion and its control. Wind erosion and its control principles of flood control. Water harvesting. Design of farm pond and earth dams. Watershed management-investigation and implementation-selection of priority areas and watershed work plan.

**2. Irrigation and Drainage Engineering :** Source of water for irrigation. Techniques of measuring soil moisture. Soil water-plant relationship, Planning and design of minor irrigation projects. Command Area Development, Irrigation scheduling, Duty of water-consumptive use. Water requirements of crops. Measurement and cost of irrigation water. Measuring devices. Flow through orifices, weirs and flumes. Land leveling Water Conveyance and control. Water application methods-border irrigation, check basin irrigation, furrow irrigation, sprinkler irrigation, drip irrigation. Irrigation efficiencies and their estimation.

Occurrence of ground water, ground water resources development and their utilization, Hydraulics of wells. Types of wells their design and construction. Drilling methods. Well development and Testing of Wells. Types of pumps, Characteristics curve and selection of centrifugal, submersible and turbine pump. Economics of Pumping.

Drainage-Definition causes of water logging. Drainage coefficient, Methods of drainage. Drainage of irrigate lands. Design of surface and subsurface systems.

**3. Agricultural Structure :** Kinds of building materials their properties, Timber, brickworks and RC construction, design of columns, beams, roof trusses, joints. Layout of farm-stead. Design of farm houses, farm roads, fences animals shelters, storage structure for food grains, feed and forage, machinery sheds, green houses, poly houses.

## SECTION - B

**1. Farm Power and Machinery :** Sources of farm power. Thermodynamics, construction and working of different types of internal combustion engines and their systems. Different types of tractors and power tiller. Clutch, power transmission, differential, final drive, power take off (p.t. o.), brake, steering, hydraulic systems, tyres and ballasting. Farm machinery for primary and secondary tillage, seeding machinery, intercultural tools and machinery. Plant protection equipment-spraying and dusting. Harvesting and threshing equipment. Machinery for land development. Ergonomics of man-machine system. Machinery for horticulture and agro-forestry, feeds and forages.

**2. Agro Energy :** Selection, installation, safety and maintenance of electric motors for agricultural applications. Solar, wind and biogas energy and their utilization in agriculture. Energy plantation and briquetting ; gasifiers and energy efficient cooking stoves.

**3. Agricultural Process and Food Engineering :** Importance processing of agricultural products. Principles and equipment for cleaning, grading, sorting and size separation. Engineering properties of agricultural produces and by products. Material handling equipment such as belt and screw conveyors, bucket elevators etc ; their capacity and power requirement. Mechanical properties of biological materials ; size reduction and power requirement. Related machineries, Shelling, dehusking, and decortication of agricultural products. Milling and polishing, Mechanical extraction and solvent extraction of oils. Technology of processing of cereal products viz. paddy, wheat pulses and oil seeds. Relates machinery, their maintenance; and plant layout. Psychrometry, Theory of grain drying, Different types of grain dryers and dryer efficiency. Principles of preservation of foods. Various food preservation techniques viz-drying, heat-treatment such as pasteurization, sterilization etc.; chemical treatment, refrigeration, freezing etc. Processing of milk and dairy products-homogenization, cream separation, sprayer and roller drying, butter making, ice cream, cheese and milk products Principles of heat and mass transfer and their application in the analysis of simple processing operations such as drying, evaporation, extraction.