

Code 11 : MAJOR SUBJECT GROUP – WATER SCIENCE AND TECHNOLOGY

(Subject : 11.1 : Water Science and Technology)

Unit – I : Importance of Agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon – pea, sugarcane, groundnut, tomato and mango. Major soils of India, role of NPK and their deficiency symptoms. Structure and function of cell organelles; mitosis and meiosis; Mendelian genetics; elementary knowledge of photosynthesis; respiration, and transpiration; structure and functions of carbohydrates, proteins, nucleic acids, enzymes and vitamins. Pests and diseases of major crops and their management, important rural development programs in India; organizational set up of agricultural research, education and extension in India.

Unit – II : Water resources of India, surface and groundnut resources, rainfall, rainfall – runoff relations, measurement and estimation of runoff, irrigation development in India, command area development, watershed management principles, government schemes in watershed management program, water harvesting structures including farm ponds, water quality including physical, chemical and biological properties.

Unit – III : Physical properties of soils – texture, structure, density and consistency, infiltration, field capacity, permanent wilting point, available water hydraulic conductivity, soil water flow including Darcy's law, mechanical analysis, chemical properties of pH, EC, atoms, molecules, colloids, clay mineral, major and trace elements, salinity and sodicity, cation exchange capacity, evaporation, evapotranspiration, water requirements of crop, plant growth process, soil and water conservation practices and tillage.

Unit – IV : Simultaneous and quadratic equations, differentiation and integration, differential equations, elements of statistics, frequency distribution, probability concepts, basic concepts of economics, energy, horse power, efficiency of machines, concepts of fluid flow, hydrostatic pressure, surface tension, irrigation water distribution and control, irrigation methods, irrigation efficiencies, irrigation scheduling, water lifting devices and pumps, construction of wells, drainage principles and applications, surface drainage, subsurface drainage, water pricing, water laws and irrigation acts.