ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:3hrs/week

AGRO203 (2) **IRRIGATION WATER MANAGEMENT, FARMING SYSTEMS AND** Marks:60

**SUSTAINABLE AGRICULTURE**

w.e.f AJ 2022-2023 **SYLLABUS**

**Objectives**

* To determine bulk density
* To know lay out of surface irrigation methods
* To determine soil moisture content by gravimetric and volumetric method
* To determine infiltration rate

**Course Outcomes**

At the end of the course, students will be able to

**CO1:** Summarize the farming and cropping systems in India.

**CO2:** List and explain different allied enterprises.

**CO3:**Explain the techniques of sustainable agriculture and development of integrated farming systems, including models for different agri-climatic zones.

**CO4:** Discussthe properties and relationship of natural resources and their importance in integrated farming systems.

**CO5:** Summarize different aspects and methods of irrigation.

**THEORY**

**UNIT -1 (6hrs)**

1. Farming System – introduction – scope of farming system – importance – concept – principles of farming system.

2. Types of farming systems – advantages and limitations - suitability – factors affecting the farming system

3. Farming systems – system and systems approach - determinants of farming system – cropping systems(navadhanya concept) and related terminology

4. Allied enterprises – significance of integrating crop and livestock enterprises – components and maintenance- dairying and sheep and goat rearing – breeds – housing– feed and fodder requirements – biogas plant

5. Allied enterprises – poultry farming – breeds – housing –feed and fodder requirements – apiculture – species and management

6. Allied enterprises – sericulture – moriculture and silkworm rearing – agro-forestry systems suitable for dryland farming

7. Tools for determining production and efficiencies in different farming and cropping systems.

**UNIT-II (6hrs)**

1. Adverse effects of modern agriculture - sustainable agriculture –definition –concept – goals – elements.

2. Problems related to soil, water and environment - adaptation and mitigation strategies - indicators of sustainability.

3. Conservation agriculture – concept – need - management of natural resources land, water and vegetation.

4. Techniques for sustainability - Low External Input Agriculture (LEIA)and Low External Inputs for Sustainable Agriculture (LEISA) and HEIA (High External Input Agriculture).

5. Integrated farming system-historical background, objectives and characteristics advantages

6. Site specific development of IFS models for different agro climatic zones of India and A.P.

**UNIT -III (6hrs)**

1. Resource use efficiency – optimization of resource use by different methods in an IFS(Annapurna model)

2. Resource cycling - flow of energy in different farming systems. Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field

3. Introduction – importance – definition and objectives - water resources of world.

4. Surface and ground water resources in India and Andhra Pradesh–important major irrigation projects in India and Andhra Pradesh.

5.Soil-water relations – physical properties of soil viz., depth, soil texture, soil structure, particle density, bulk density and porosity influencing water retention, movement and availability.

6. Water retention in soil – adhesion and cohesion – soil moisture tension – pF – soil moisture characteristic curves- Water movement in soils – infiltration – percolation – seepage – permeability – hydraulic conductivity – saturated and unsaturated water flow.

**UNIT -IV (6hrs)**

1. Kinds of water in soil – gravitational water – capillary water – hygroscopic water – their importance in crop production - Soil moisture constants – saturation – Field capacity (FC) – Permanent Wilting Point (PWP) – Available Soil Moisture (ASM) – hygroscopic coefficient –theories of soil water availability.

2.Plant-water relationships – rooting characteristics – effective root zone depth – moisture extraction pattern – moisture sensitive periods of crops – Soil Plant Atmospheric Continuum (SPAC).

3.Evapotranspiration – evaporation – transpiration – factors influencing evapotraspiration – Reference crop evapotraspiration (ETo) – Crop coefficient – Crop Evapotranspiration (ETc) - daily, seasonal and peak period consumptive use.

4.Crop water requirement – irrigation requirement – net and gross irrigation requirement – irrigation interval – irrigation period – seasonal water requirement of important crops – duty of water – base period – relation between duty and base period – conjunctive use of water – advantages of conjunctive use.

5.Scheduling of irrigation – different criteria – soil moisture regime approach – feel and appearance method – soil moisture tension and depletion of available soil moisture method - climatological approach – Irrigation Water (IW) / Cumulative Pan Evaporation (CPE) ratio method.

6. Scheduling of irrigation – plant indices approach – visual symptoms – soil cumsand mini plot technique – growth rate – relative water content – plant water potential – canopy temperature – indicator plants and critical growth stages.

**UNIT – V (6hrs)**

1. Methods of irrigation - surface methods – wild flooding check basin, ring basin, border strip, furrow and corrugations – advantages and disadvantages- Sub surface irrigation.

2. Micro irrigation systems - sprinkler irrigation – merits and demerits – system components and layout – suitable crops – rain guns.

3. Drip irrigation (surface and sub surface) – merits and demerits – system components and layout – suitable crops - fertigation and maintenance of micro irrigation systems.

4. Water Use Efficiency (WUE) – crop and field water use efficiency – factors influencing WUE – climatic, genetic and management (agronomic) factors - Irrigation efficiencies – water conveyance efficiency, water application efficiency, water storage efficiency, water distribution efficiency and project efficiency.

5. Quality of irrigation water – salinity hazard, sodium hazard, residual sodium carbonate and boron toxicity – criteria and threshold limits – management practices for using poor quality water.

6. Water logging – causes for water logging – drainage- surface and sub-surface drainage systems – relative merits.

**References text books**

1. Michael, A.M. 2006. Irrigation – Theory and Practice. Vikas Publishing House Pvt. Ltd., New Delhi. Reddy, S.R. 2016.
2. Arun K. Sharma. 2006. A hand book of organic farming - Agrobios(India) Jodhpu
3. Jayanthi C, Devasenapathy P and Vinnila, C. 2008. Farming systems principles and practice. Satishserial publishing house, Delhi
4. Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur.
5. Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university

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