

## **Introduction to Agricultural Engineering 3(2+1)**

### **OBJECTIVE:-**

To enable the students to have basic idea on different agricultural engineering applications and the machinery involved in different farm operations, post-harvest and allied activities.

### **THEORY:-**

Agricultural Engineering as a discipline; Major divisions of Agricultural Engineering; Importance of Agricultural Engineering for today's agriculture; Different sectors of employment for Agricultural Engineers; Scope of research and higher studies in Agricultural Engineering in India and abroad. Farm mechanization needs and strategy; Classification of farm machinery on the basis of unit operations; Principles of selection of machinery for different sizes of land and matching power sources; Different types of equipment for tillage, sowing, planting and transplanting, fertilizer application, weed control, plant protection; Harvesting and threshing equipment for rice, wheat, maize, cotton, sugarcane, fruits, tuber crops and other locally important crops; Functions and capabilities of tractor and power tillers; Introduction to the IC engine systems, fuel and air supply systems, cooling and lubricating systems, and electrical systems in a tractor; Basic parts of a power tiller; Hitching system. Introduction to renewable energy systems; Types of biogas plants, Types of solar energy collectors; Solar water heating systems, solar dryers, solar photovoltaic systems; Wind mills and their different parts. Importance of soil and water conservation; Different agronomic measures for control of water erosion, mixed cropping, crop rotation, tillage practices, mulching; Different engineering measures; gully control measures. Use of topographical survey and contour maps. Different types of water harvesting structures. Introduction to soil-plant-water relationship; Equipment for measurement of irrigation water, viz. weirs, notches, orifices and mouth pieces; Introduction to different surface irrigation methods as border, furrow and check basin, sprinkler, drip irrigation and their different components; Underground water conveyance methods in pipes; Introduction to planning of drainage systems; Introduction to centrifugal pumps and different components. Different types of agricultural structures; Introduction to planning and layout of farmsteads, animal houses, poultry houses; Different types of grain storage structures; Greenhouse and its different parts; Low cost protected structures. Classification of different types of agricultural commodities as durables, perishables, etc.; Moisture content and its importance in grain storage; Common reasons of food spoilage, food preservation methods; Different primary processing operations and their necessity; Methods and equipment used for cleaning, washing, sorting, grading, peeling, size reduction; Different types of traditional and modern storage structures; Storage of perishable commodities; Different types of packaging materials and their suitability for various food products; Basic principles of value addition of food as drying and dehydration, evaporation, thermal processing, refrigerated and frozen storage, chemical preservation and other novel methods.

### **PRACTICAL:-**

Study of various implements (tillage, sowing, planting, weeding, fertilizer application); Study of farm implements (pesticide application, harvesting and threshing); Study of various components of tractor

and matching implements; Study of various components of power tiller and matching implements; Study of various types of biogas plants and operational parameters; Study of various solar energy application systems; Study on various components of sprinkler and drip irrigation; Study on various components centrifugal pump; Study of various post-harvest operations; Study of different food processing equipment; Value addition of common crops; Visit to a greenhouse with modern irrigation system; Visit to implement manufacturing unit; Visit to a mechanized farm; Visit to a watershed; Visit to a food processing industry.

#### **SUGGESTED READINGS :-**

1. Chakraverty A. 1999. Post Harvest Technology of Cereals, Pulses and Oilseeds. Oxford & IBH publishing Co. Ltd., New Delhi.
2. Dash S K, Bebartta J P and Kar. 2012. A. Rice Processing and Allied Operations. Kalyani Publishers, New Delhi.
3. Jain S C and Philip G. 2009. Farm Machinery - An Approach. Second Edition. Standard Publishers and Distributors, New Delhi.
4. Mal B C. 2014. Introduction to Soil and Water Conservation Engineering. 2014. Kalyani Publishers.
5. Michael A M and Ojha T P. 2003. Principles of Agricultural Engineering. Jain Brothers, New Delhi.
6. Michael A M. 2012. Irrigation: Theory and Practice. Vikas Publishing House New Delhi.
7. Nakra C P. 1980. Farm Machines and Equipment. Dhanpat Rai Publishing Company Pvt. Ltd, New Delhi.