

22BEAS202 TILLAGE AND SOWING OPERATION

Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Farm mechanization, Construction materials, Heat treatment, Cost Estimation, Tillage Operation and equipment, Sowing operation & equipment.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to build a grasp of the principles of Farm Machinery and Equipment-I through Farm mechanization, Construction materials, Heat treatment, Cost Estimation, Tillage operation and equipment, sowing operation & equipment that serves as an essential tool in several engineering applications..

MODULE-1

UNIT-1

4L+0T+6P=10 Hours

CONSTRUCTION MATERIALS & HEAT TREATMENT:

Introduction to materials used in construction of farm machines. Heat treatment processes and their requirement in farm machines. Properties of materials used for critical and functional components of agricultural machines. Introduction to steels and alloys for agricultural application. Identification of heat treatment processes specially for the agricultural machinery components.

UNIT-2

4L+0T+10P=14 Hours

FARM MECHANIZATION AND COST ESTIMATION:

Introduction to farm mechanization. Classification of farm machines. Unit operations in crop production. Identification and selection of machines for various operations on the farm. Hitching systems and controls of farm machinery. Calculation of field capacities and field efficiency. Calculations for economics of machinery usage, comparison of ownership with hiring of machines.

PRACTICES:

- Identification of materials of construction in agricultural machinery.
- Study of material properties.
- Study of heat treatment processes subjected to critical components of agricultural machinery.
- Familiarization with different farm implements and tools.
- Study of hitching systems.
- Problems on machinery management.

MODULE-2

UNIT-1

4L+0T+10P=14 Hours

TILLAGE OPERATION AND EQUIPMENT:

Introduction to seed-bed preparation and its classification. Familiarization with land reclamation and earth moving equipment. Introduction to machines used for primary tillage, secondary tillage, rotary tillage, deep tillage and minimum tillage. Measurement of draft of tillage tools and calculations for power requirement for the tillage machines. Introduction to tillage machines like mould-board plough, disc plough, chisel plough, sub-soiler, harrows, cultivators, Identification of major functional components. Attachments with tillage machinery.



Source: <https://www.britannica.com/topic/tillage>

SKILLS:

- ✓ Operate tillage implements for paddy cultivation.
- ✓ Operate sowing and plant protection implements for paddy cultivation.
- ✓ Select machines for paddy cultivation based on field conditions.
- ✓ Compute the cost of operation of farm machinery.
- ✓ Select material of construction for tillage implements

UNIT-2**4L+0T+6P=10 Hours****SOWING OPERATION AND EQUIPMENT:**

Introduction to sowing, planting & transplanting equipment. Introduction to seed drills, no-till drills, and strip-till drills. Introduction to planters, bed-planters and other planting equipment. Study of types of furrow openers and metering systems in drills and planters. Calibration of seed-drills/ planters. Adjustments during operation.

PRACTICES:

- Study of primary and secondary tillage machinery – construction, operation, adjustments and calculations of power and draft requirements.
- Study of sowing and planting equipment – construction, types, calculation for calibration and adjustments.
- Study of transplanters – paddy, vegetable, etc.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply to design and development of crop production machinery based on various input data.	Apply	2	1, 3, 5, 6
2	Apply and application of material substitution in production of farm machineries.	Apply	1	3, 5, 9, 10, 11
3	Analyze the various machinery components and tools used in crop production operation.	Analyze	1	1, 3, 5
4	Evaluate and determine the cost economics of the crop production machineries.	Evaluate	2	4, 6, 9, 11

TEXT BOOKS:

1. Ojha, T. P and Michael, A. M., "Principles of Agricultural Engineering Vol. I". Jain Brothers, New Delhi, 2011.
2. Sahay, J "Elements of Agricultural Engineering". Standard Publishers and Distributors, New Delhi, 2015.

REFERENCE BOOKS:

1. Yadav, R and Solanki, H. B."Numericals and Short Questions in Farm machinery, Power and Energy in Agriculture". New India Publishing Agency, New Delhi, 2009.