



| S.No. | Topic   | No of Lectures |
|-------|---|----------------|
| 7.    | Statistics, confidence limits, significance, contingency tables, analysis of variance.                            | 1              |
| 8.    | Regression and correlation. Monte Carlo methods and applications to farm machinery.                               | 3              |
| 9.    | System modeling in farm machinery: Numerical methods, analogs, models with uncertainty stochastic service system. | 3              |
| 10.   | Feasibility system design-stability   | 1              |
| 11.   | Deterministic systems and stochastic systems.   | 2              |
| 12.   | Optimum Design: Trial and error, differential calculus, calculus of variations                                    | 2              |
| 13.   | Allocations: Linear programming, simplex technique Transportation and assignment technique                        | 4              |
| 14.   | Critical path scheduling, dynamic programming, game and its applications to farm machinery management.            | 4              |
|       | <b>Total</b>  | <b>32</b>      |

### IX. List of Practicals

| S.No. | Topic   | No. of Practicals |
|-------|---|-------------------|
| 1.    | Problems solving of mathematical models of field machinery, constraints, power constraints, weather constraints       | 3                 |
| 2.    | Mathematical problems relates to tillage, seeding, chemical application harvesting and storage and irrigation systems | 3                 |
| 3.    | Problem solving in Economics of Engineering, calculation of investment cost, operational cost, and uncertainty cost   | 3                 |
| 4.    | Case studies in machine performance modelling, Economics of machine selection   | 2                 |
| 5.    | Case studies in machine performance modelling   | 2                 |
| 6.    | Economics of Power and machine selection  | 2                 |
|       | <b>Total</b>  | <b>15</b>         |

### X. Suggested Reading

- Hunt DR. 1986. *Engineering Models for Agricultural Production*. AVI Pub. Co., Westport, CT, USA.
- Hunt D and Wilson D. 2015. *Farm Power and Machinery Management*. Waveland Press, Illinois, USA.
- Singh S and Verma SR. 2009. *Farm Machinery Maintenance and Management*. DIPA, ICAR, New Delhi.

**I. Course Title : Machinery for Special Farm Operations**

**II. Course Code : FMPE 613**

**III. Credit Hours : 2+0**

#### IV. Aim of the course

To bring to focus special farm operations that are not covered under conventional operations and the machinery used for such operations.

#### V. Theory

##### Unit I

Machinery for land development. Tractor operated and self-propelled machines for

laying drainage system, sub surface drip laying machines, subsoiler, trenchers, laser levelers.

### Unit II

Machines for plant protection, pneumatic, thermal type sprayers, aero/drone spraying and other methods of spraying, electrostatic charging, air sleeve boom sprayer, disinfection of seed beds by micro waves and other methods. Safety aids for operator and advances in plant protection method.

### Unit III

Field plot machinery and its importance. Fertilizer and manure spreader.

### Unit IV

Machines for residue management. Silage and hay making machines.

### Unit V

Machinery for horticultural crops. Crop specific machines for cotton, sugarcane, forage/fodder. Machines for processing and handling of agricultural products.

## VI. Learning outcome

Understanding of the broad horizon of agricultural machinery used for specialized agricultural operations.

## VII. Lecture Schedule

| S.No. | Topic   | No of Lectures |
|-------|---|----------------|
| 1.    | Machinery for land development  | 1              |
| 2.    | Tractor operated and self-propelled machines for laying drainage system, sub surface drip laying machines, subsoiler, trenchers | 2              |
| 3.    | Laser levelers  | 2              |
| 4.    | Machines for plant protection   | 1              |
| 5.    | Pneumatic, thermal type sprayers  | 2              |
| 6.    | Aero/drone spraying and other methods of spraying,  | 2              |
| 7.    | Electrostatic charging, air sleeve boom sprayer   | 2              |
| 8.    | Disinfection of seed beds by micro waves and other methods  | 1              |
| 9.    | Safety aids for operator and advances in plant protection method  | 2              |
| 10.   | Field plot machinery and its importance   | 1              |
| 11.   | Fertilizer and manure spreader  | 2              |
| 12.   | Machines for residue management (in situ)   | 4              |
| 12.   | Machines for residue management (ex situ)   | 2              |
| 14.   | Silage and hay making machines  | 3              |
| 15.   | Machinery for horticultural crops   | 2              |
| 16.   | Crop specific machines for cotton, sugarcane, forage/fodder   | 2              |
| 17.   | Machines for processing and handling of agricultural products   | 1              |
|       | <b>Total</b>  | <b>32</b>      |

## VIII. Suggested Reading

- Bason ES, Sultan-Shakh EG, Smirnov II and Verniaev OV. 2016. *Theory, Construction and Calculation of Agricultural Machines*. Scientific Publishers.
- Kanafozski C and Karwowski T. 1976. *Agricultural Machines: and Construction*. Vol. I&II, Translated and published by US Dept. of Agriculture and National Science Foundation, Washington, DC, USA.
- Kepner RA, Bainer R and Barger EL. 2017. *Principles of Farm Machinery*. CBS publishers and Distributors Pvt. Ltd, New Delhi, India.