

20FM021

SIMULATION MODELING IN FARM MACHINERY AND POWER ENGINEERING

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	W/RA	SSH/HSH	CS	SA	S	BS
45	-	-	-	-	-	-	-	-

Course Description & Objective:

To acquaint and equip with the mathematical modeling of farm machinery, development of models using various techniques.

Course outcomes:

1. Student will be acquainted with the concepts of modelling and simulation from an interdisciplinary point of view.
2. Student will be able to implement and simulate models using MATLAB®.
3. Depending on the selected applications in the selectable chapters section student will acquire further knowledge of Image Processing, Optical Character Recognition, Machine Learning, Business Case Modelling and Knowledge Management.
4. If you are an enthusiastic student with only rudimentary programming knowledge Student can acquire an understanding of basic MATLAB programming.

SKILLS:

- ✓ Knowledge on designing of agriculture implements by using softwares like CREO.
- ✓ Knowledge on real time simulation of agriculture implements by using softwares like ANSYS.

UNIT I

System performance and modelling methodologies – transformation of units of measurement – dimensional homogeneity. Buckingham's Pi Theorem. Simulation for system modelling, Formulations of simulation model, validation and testing of the simulation model.

UNIT II

Experimentation with physical models and their application in farm machinery design. Sensitivity of models, scale effects, scale factors. Use of models. Complete similarity, kinematics and dynamic similarity.

UNIT III

Model laws, empirical methods in model engineering. Principle of similarity in mathematical investigations. Mathematical modelling and its limitations, etc.

UNIT IV

Mathematical modelling through ordinary differential equation of first order, second order, partial differential equations. Similarity conditions and abstract parameters determining characteristics of engines.

UNIT V

Similitude in tillage tool studies, prediction models for traction devices. Analysis of modelling behaviour in problems related to tillage, traction and earthmoving equipment.

Text books:

1. Langhaar HL. 1954. *Dimensional Analysis and Similitude*. McGraw Hill.

Reference books:

1. Sedov LI. 1991. *Similarity and Dimensional Methods in Mechanics*. Mir Publ., Moscow.

ACTIVITIES:

- o *Modeling and simulation of cultivator with any one soil conditions.*