

19AG212 ENGINEERING PROPERTIES OF AGRICULTURAL PRODUCE

Hours Per Week :

L	T	P	C
1	0	2	2

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
15	-	30	10	45	-	-	-	-



Source :

<https://previews.123rf.com/images/galdzer/galdzer0904/galdzer090400177/4677435-wheat-and-hands-of-the-old-farmer-harvesting.jpg>

COURSE DESCRIPTION AND OBJECTIVES:

To acquaint and equip the students with different engineering properties and its application in design of food processing equipments.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand, discuss and describe different properties of agricultural produce.	---
2	Apply their knowledge of properties of agricultural produce during packaging, material handling and other unit operation in industry level.	1
3	Analyse the problems which take place in industry while thermal properties of agricultural produce is considered.	3
4	Evaluate the trend and current scenario of material handling develop new idea by considering aerodynamic properties.	4
5	Apply and develop different process equipments by considering several rheological properties.	3
6	Creative the existing problems in different unit operation which is going on and replace the idea with electrical properties of agricultural produce.	7,9

SKILLS:

- ✓ Measure engineering properties of various agricultural products for the application of various designs in agricultural processing.
- ✓ Storage of products based on their characteristics.
- ✓ Design venturi assembly for fertigation.

- UNIT - I** **L-3**
 Classification and importance of engineering properties: Agricultural Produce, shape, size, roundness, sphericity, volume, density, porosity, specific gravity, surface area of grains, fruits and vegetables.
- UNIT - II** **L-3**
 Thermal properties: Heat capacity, Specific heat, Thermal conductivity, Thermal diffusivity, Heat of respiration, Co-efficient of thermal expansion.
- UNIT - III** **L-3**
 Friction in agricultural materials: Static friction, Kinetic friction, rolling resistance, angle of internal friction, angle of repose, Flow of bulk granular materials, Aero dynamics of agricultural products, drag coefficients, terminal velocity.
- UNIT - IV** **L-3**
 Rheological properties: force, deformation, stress, strain, elastic, plastic and viscous behaviour, ideal classical models, rheological models, Newtonian and Non-Newtonian liquid, Viscoelasticity, Newtonian and Non-Newtonian fluid, Pseudo-plastic, Dilatant, Thixotropic, Rheopectic and Bingham Plastic Foods, Flow curves.
- UNIT - V** **L-3**
 Electrical properties: dielectric loss factor, loss tangent, A.C. conductivity and dielectric constant, method of determination. Application of engineering properties in handling processing machines and storage structures.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS

TOTAL HOURS: 30

1. Determination of surface area of the agricultural materials.
2. Determination of the shape and size of grains..
3. Determination of the shape and size of fruits and vegetables.
4. Determination of bulk density.
5. Determination of true density.
6. Determination of specific gravity.
7. Determination of angle of repose of grains.
8. Determination of the particle density/true density and porosity of solid grains.
9. Finding the co-efficient of external and internal friction of different crops.
10. Determination of filling angle of repose.
11. Determination of emptying angle of repose.
12. Finding out the terminal velocity of grain sample.
13. Finding the thermal conductivity of different grains.
14. Determination of hardness of food material.
15. Practical examination.

TEXT BOOK :

1. Mohesin, N.N. 1980,. "Physical Properties of Plants & Animals". Gordon & Breach Science Publishers, New York..

REFERENCE BOOKS:

1. Mohesin, N.N. 1980, "Thermal Properties of Foods and Agricultural Materials".Gordon & Breach Science Publishers, New York.
2. Prentice, J.H. 1984, "Measurement in Rheological Properties of Food Stuffs".Elsevier Applied science Pub. Co. Inc. New York.
3. Rao, M. A and Rizvi, S.H.1995, "Engineering Properties of Foods". Marcel Dekker Inc. New York.
4. Singhal O P and Samuel D V K. 2003, "Engineering Properties of Biological Materials".Saroj Prakashan.