



- I. Course Title : Farm Structures and Environmental Control**
II. Course Code : PFE 514
III. Credit Hours : 2+1

IV. Aim of the course

To acquaint and equip the students with the different types of farm structures and techniques, to control atmospheric parameters and to create favourable environment in the agricultural structures.

V. Theory

Unit I

Farmstead planning, survey and data collection for information bank. Analysis of data, Lay outs. Cost estimation and appraisal. Project development; Time, motion and input analysis, flow charts and drawings and case studies.

Unit II

Farm structures (farmstead, livestock, poultry, storage godowns, farm machinery storage, biogas, green house, net house etc), their design, constructional details and design of low cost structures. Heating, ventilating and exhaust systems, air distribution and air cleaning, combustion of fuels and equipment.

Unit III

Drying and dehumidification system, air-water contact operations and evaporation, process and product air conditioning, energy efficient environmental control practices. Rural electrification, households electric wiring, rural water supply and sanitation.

Unit IV

Instruments and measurements: Codes and standards.

VI. Practical

Calculation of heating and cooling load, design calculation of moisture condensation in agricultural buildings, study of moisture migration behaviour in storage bins, design aspect of green house, net house, septic tank, grain storage structures, cold storage.

VII. Learning outcome

Student's capability to design new farm structures and create suitable atmosphere within it.

VIII. Lecture Schedule

S.No.	Topic	No. of Lectures
1.	Farmstead Planning, types and objectives. Planning principles and layout, design and construction of farmstead.	2
2.	Survey and data collection for information bank. Analysis of data, Lay outs. Cost estimation and appraisal.	2
3.	Project development: Time, motion and input analysis, flow charts and drawings and case studies.	2
4.	Farm structure, layout and structural design of shelters for dairy animals (cow, buffaloes, calves, bulls etc).	3
5.	Layout and structure design of modern poultry houses (cage type) along with other associated structures.	2



S.No.	Topic	No. of Lectures
6.	Familiarization with various rural grain storage structures. Layout, design and constructional detail of grain and feed storage structures like bins and silos.	3
7.	Layout and structural design of storage structures for farm inputs like farm machinery, seeds, weedicides, insecticides and fertilizers.	1
8.	Ventilation utility in farm buildings; principles of natural ventilation; psychometric processes; heat and mass balance equation for ventilation; ventilation rates for temperature moisture and odour control.	3
9.	Rural electrification, households electric wiring, rural water supply and sanitation.	2
10.	General design considerations, operational and maintenance of biogas plant.	2
11.	Drying and dehumidification system, air-water contact operations and evaporation, process and product air conditioning, energy efficient environmental control practices.	3
12.	Environmental indices like THI; wet bulb depression, daily range, degree days, effective temperature, black globe temperature; mean radiant temperature, etc. Basic solar-earth angles and sol-air temperature.	3
13.	Instruments and measurements; Codes and standards.	2
	Total	30

IX. List of Practicals

S.No.	Topic	No. of Practicals
1.	Planning and layout of a farmstead.	1
2.	Instruments for measurements of environmental parameters.	1
3.	Design of a farm fencing system.	1
4.	Study of moisture migration behaviour in storage bins.	1
5.	Design aspect of Septic tank.	1
6.	Design aspect of Net house.	1
7.	Design aspect of Grain storage structures.	1
8.	Design aspect of Green house.	1
9.	Design aspect of Cold storage.	1
10.	Design of a feed/fodder storage structures.	1
11.	Design of a biogas plant.	1
12.	Calculation of heating and cooling load.	1
13.	Design calculation of moisture condensation in agricultural buildings.	1
14.	Design of ventilation system for dairy and poultry house.	1
15.	Visit to Green/ Net house and cold storage.	2
	Total	16

X. Suggested Reading

- Albright LD. 1990. *Environmental Control for Animals and Plants*. ASAE Textbooks.
- Esmay ML and Dixon JE. 1986. *Environmental Control for Agricultural Buildings*. The AVI Corp.
- Gaudy AF and Gaudy ET. 1988. *Elements of Bioenvironmental Engineering*. Engineering Press.
- Moore FF. 1994. *Environmental Control Systems: Heating, Cooling, Lighting*. Chapman and Hall.
- Threlkeld JL. 1970. *Thermal Environmental Engineering*. Prentice Hall.