B.Sc. (Hons.) Agriculture

Sixth Dean's Committee Syllabus

DEPARTMENT OF AGRICULTURAL ENGINEERING

S. No.	SEM.	COURSE TITLE	COURSE CODE	CREDIT HRS.
1.	III	SEC-IV (POST-HARVEST PROCESSING TECHNOLOGY)	AGE-211	2 (0 + 2)
2.	III	FARM MACHINARY & POWER	AGE-212	2 (1 + 1)
3.	IV	AGRICULTURAL INFORMATICS & ARTIFICIAL INTELLIGENCE	AGE-221	3 (2 + 1)
4.	VI	RENEWABLE ENERGY IN AGRICULTURE & ALLIED SECTOR	AGE-321	2 (1 + 1)
5.	VII	PROTECTED CULTIVATION (E)	AGE-411 A	4 (3 + 1)
6.	VII	POST-HARVEST TECHNOLOGY & VALUE ADDITION (E)	AGE-411 B	4 (3 + 1)
7.	VII	SYSTEM SIMULATION & AGRO-ADVISORY (E)	AGE-411 C	4 (3 + 1)

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III-SEMESTER

AGE-211: SEC-IV (POST-HARVEST PROCESSING TECHNOLOGY) 2

(0 + 2)

PRACTICAL

The practical component of the course will focus on study of post-harvest processing techniques. This includes:

1. Study of post-harvest handling techniques.
2. Study of cleaning, sorting, and grading of agricultural products.
3. Study of controlled atmosphere storage systems.
4. Study of processing techniques such as drying.
5. Study of processing techniques such as freezing.
6. Study of value addition in cereals such as wheat and paddy.
7. Study of value addition in pulses such as arhar.
8. Study of value addition in oilseeds such as sunflower.

III-SEMESTER

AGE-212: FARM MACHINERY AND POWER 2 (1 + 1)

THEORY

Familiarization with the primary and secondary tillage implements (Indigenous-mouldboard-disc ploughs, harrows, and cultivators). Familiarization with sowing (seed-drill, seed-cum-fertilizer drill, and calibration of a seed-drill) and planting (sugarcane and potato planter) equipment. Familiarization with plant protection equipment (sprayer and duster). Familiarization with harvesting (mower and reaper) and threshing (power thresher). Study of internal combustion engines (four-stroke and two-stroke cycle internal combustion engine).

PRACTICAL

1. Study of construction and working of mouldboard and disc plough.
2. Study of construction and working of harrows and cultivators.
3. Study of construction and working of seed drills.
4. Study of construction and working of sugarcane and potato planters.
5. Study of construction and working of power thresher.
6. Study of construction and working of four and two-stroke cycle engine.

IV-SEMESTER

AGE-221: AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE 3 (2 + 1)

THEORY

Part-I (Computer Science Basics – Outsourced by Computer Department)

Introduction to computers: Definition, types, and components. Overview of windows operating systems. Microsoft Office applications: Document creation, editing, and formatting. Data presentation using bar, line, and pie graphs. Statistical analysis using Microsoft Excel (mean, median, and mode), mathematical expressions (sum, average and standard deviation). Introduction to the World Wide Web (WWW) and basic internet concepts.

Part-II (Applications in Agriculture – Agricultural Engineering Department)

Introduction to computer-controlled devices (automated systems) for agri-input management (automated irrigation computer control systems). Introduction to smartphone and various Apps in agriculture for farm advise (Kisan Suvidha, Indian Farmers Fertilizer Cooperative Limited also known as IFFCO Kisan agriculture, RML farmer–Krishi Mitr, and Pusa Krishi). Introduction to artificial intelligence, its background, applications, and search techniques. Role of artificial intelligence in agriculture: smart farming, automation, and case studies on AI-driven farming.

PRACTICAL

1. Study of computer hardware components and its accessories.
2. Introduction to the basics of MS Windows operating systems.
3. Study of file creation, folder management, and data organization.
4. Application of Microsoft Word and PowerPoint for agricultural documentation and presentations.
5. Study of various mobile applications used for farm advisory.
6. Study of artificial intelligence and its practical use in agriculture.

* **Note**: Run by computer and agricultural engineering department.

VI-SEMESTER

AGE-321: RENEWABLE ENERGY IN AGRICULTURE & ALLIED SECTOR 2 (1 + 1)

THEORY

Introduction to Renewable Energy: Classification of energy sources and contribution of these sources in agricultural sector. Biomass Energy: Familiarization with biomass and its utilization for biofuel production and their application. Biogas Technology: Familiarization with major types of biogas plants (KVIC, Janata, Deenbandhu model) used in rural part of India. Solar Energy Applications: Introduction to solar energy, collection and their application. Solar cooker, solar water heater, solar drying, solar pond, solar distillation system, solar photovoltaic system and their application. Wind Energy Utilization: Introduction to wind energy and their application.

PRACTICAL

1. Study of renewable energy gadgets.
2. Study of construction and working of biogas plants.
3. Study of solar photovoltaic system.
4. Study of solar distillation system.
5. Study of water heating system.
6. Study of wind mills and their practical applications.

VII-SEMESTER

AGE-411 A: PROTECTED CULTIVATION (ELECTIVE COURSE)

4 (3 + 1)

THEORY

Importance and scope of protected cultivation, status in India and the world. Greenhouse technology: definition, major types, and applications in agriculture. Materials used in greenhouse/polyhouse structures. Greenhouse environmental control: ventilation, artificial lights, temperature, humidity, and carbon dioxide enrichment. Irrigation management in protected structures. Greenhouse cultivation of important crops.

PRACTICAL

1. Determination of moisture content for a given data (based on wet and dry basis).
2. Study of different types of greenhouse and their structural components.
3. Study of temperature and humidity control in greenhouse cultivation.
4. Study of cooling and ventilation techniques commonly used in greenhouse.
5. Study of tillage and intercultural operations used in greenhouse cultivation.
6. Study of irrigation through drip and sprinkler techniques.

VII-SEMESTER

AGE-411 B: POST-HARVEST TECHNOLOGY AND VALUE ADDITION (ELECTIVE COURSE) 4 (3 + 1)

THEORY

Importance of post–harvest processing of cereals (wheat and paddy), pulses (arhar) and oil-seeds (sunflower). Extent and possible causes of post-harvest losses. Pre-harvest factors affecting post-harvest quality. Harvesting and field handling techniques. Cold storage and its impact on produce and shelf-life. Concept of value addition and its importance in post-harvest management. Principles and methods of drying.

PRACTICAL

1. Familiarization with the basics of post-harvest techniques for shelf-life extension.
2. Study of temperature effects on shelf life and quality of cereals, pulses and oil-seeds.
3. Study of preservation of cereals, pulses and oil-seeds.
4. Study of quality evaluation of post-harvest products.
5. Study of cold storage and its impact on produce and shelf-life.
6. Study of principles and methods of drying.

** NOT OFFERED by the department due to lack of proper resources.*

VII-SEMESTER

AGE-411 C: SYSTEM SIMULATION AND AGRO-ADVISORY 4 (3 + 1)

THEORY

Introduction to cropwat crop growth model: basics, types, functions, and applications in agriculture. Data requirements for crop growth models and their sources, both in India and Globally. Spatial and temporal considerations in crop growth modeling. Input and output requirements of crop simulation models. Estimation of potential and achievable crop production using model. Overview of weather forecasting: types and methods used for agricultural applications.

PRACTICAL

1. Familiarization with major crop growth models and use in agro-advisory.
2. Study of principles and methodologies behind cropwat model.
3. Study of data requirements for cropwat model.
4. Study of crop management practices adopted in cropwat model.
5. Study of crop growth models developed in India.
6. Study of potential and achievable crop production using model.

** NOT OFFERED by the department due to lack of proper resources.*

Ph.D

DEPARTMENT OF AGRICULTURAL ENGINEERING

Course Title: Advances in Hydrology

Course Code: SWCE 601 (4 + 0)

Theory

Hydrologic models, processes and systems. Uncertainty in hydrological events. Statistical homogeneity. Probabilistic concept. Frequency analysis. Probability distribution of hydrological variables. Confidence intervals and hypothesis testing. Simple and multiple linear regressions, correlation, statistical optimization and reliability of linear regression models. Analysis of hydrologic time series and modeling. Auto–correlation, correlogram and cross-correlation analysis. Markov processes, stochastic hydrologic models including Markov chain models. Generation of random variates. Hydrology of climate extremes. Area-duration-frequency curves. Regional flood frequency analysis. Formulation of various steps involved in formulation of statistical models and their application in hydrology.

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