

|           |                                          |          |   |   |   |   |        |                      |
|-----------|------------------------------------------|----------|---|---|---|---|--------|----------------------|
| 25MAGT301 | INTRODUCTION TO AGRICULTURAL ENGINEERING | Category | L | T | P | R | Credit | Year of Introduction |
|           |                                          | VAC      | 4 | 0 | 0 | 0 | 4      | 2025                 |

#### Preamble

To enable students to understand the fundamentals of Agricultural Engineering, including soil and water conservation, agricultural machinery, power systems and food processing principles.

**Prerequisite:** Nil

**Course Outcomes:** After the completion of the course, the student will be able to:

| CO  | Course Outcomes                                                                      | Knowledge Level |
|-----|--------------------------------------------------------------------------------------|-----------------|
| CO1 | Explain the role, scope, and importance of Agricultural Engineering as a discipline, | K2 Understand   |
| CO2 | Explain on soil erosion and irrigation and drainage principles                       | K2 Understand   |
| CO3 | Explain the classification, working principles, and components of farm machines.     | K2 Understand   |
| CO4 | Explain engineering properties in food processing and preservation                   | K2 Understand   |

#### Mapping of course outcomes with program outcomes and program specific outcomes

| CO  | PO1 | PO2 | PO3  | PO4 | PO5 | PO6  | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 |
|-----|-----|-----|------|-----|-----|------|-----|-----|-----|------|------|------|------|
| CO1 | 3   | 1   | 1    | 1   | -   | 3    | 2   | -   | -   | -    | -    | 3    | 2    |
| CO2 | 3   | 2   | 1    | 1   | -   | 3    | 2   | -   | -   | -    | -    | 3    | 3    |
| CO3 | 3   | 2   | 2    | 1   | -   | 2    | -   | -   | -   | -    | -    | 3    | 2    |
| CO4 | 3   | 1   | 1    | 1   | -   | 3    | 2   | -   | -   | -    | -    | 3    | 3    |
| Avg | 3   | 1.5 | 1.25 | 1   | -   | 2.75 | 2   | -   | -   | -    | -    | 3    | 2.5  |

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

#### Mapping of Course Outcomes with Knowledge and Attitude Profile (WK)

| CO  | WK1 | WK2 | WK3 | WK4 | WK5 | WK6 | WK7 | WK8 | WK9 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CO1 | *   | *   | *   | *   | *   |     | *   | *   | *   |
| CO2 | *   | *   | *   | *   | *   |     | *   | *   | *   |
| CO3 | *   | *   | *   | *   | *   |     | *   | *   |     |
| CO4 | *   | *   | *   | *   | *   |     | *   | *   | *   |

#### Wks Mapped with the Course

| WK1 | WK2 | WK3 | WK4 | WK5 | WK6 | WK7 | WK8 | WK9 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| *   | *   | *   | *   | *   |     | *   | *   | *   |

#### Mark Distribution

| Total Marks | CIE Marks | ESE Marks | ESE Duration |
|-------------|-----------|-----------|--------------|
| 100         | 40        | 60        | 2.5 hrs      |

### **Continuous Internal Evaluation Pattern**

|                                  |            |
|----------------------------------|------------|
| Attendance                       | : 5 marks  |
| Continuous Assessment Test       | : 20 marks |
| Continuous Assessment Assignment | : 15 marks |

## **SYLLABUS**

### **Module 1 (11 hrs)**

Agricultural Engineering as a discipline; Major divisions of Agricultural Engineering; Importance of Agricultural Engineering for today's agriculture; Different sectors of employment for Agricultural Engineers; Scope of research and higher studies in Agricultural Engineering in India and abroad Farm mechanization needs and strategy

### **Module 2 (15 hrs)**

Soil erosion, Different agronomic and engineering measures for control of water erosion, Different gully control structures, Introduction to soil-plant-water relationship, irrigation -need and methods, Drainage systems – Needs and types, Introduction to centrifugal pumps. Importance of renewable energy in sustainable agricultural operations and rural development, Basic concepts: Solar energy, Wind energy, Biomass energy, Biogas, and Small hydro energy, Solar energy applications in agriculture

### **Module 3 (15 hrs)**

Classification of farm machines, Seed-bed preparation and its classification, Machines used for primary tillage, secondary tillage, rotary tillage, Attachments with tillage machinery; Hitching systems and controls. IC engine systems, fuel and air supply systems, cooling and lubricating systems, and electrical systems in a tractor; Basic parts of a power tiller.

### **Module 4 (15 hrs)**

Different engineering properties of food, Biochemical reactions involved in food processing and storage; Food spoilage agents, general methods for food preservation Classification of microorganisms, multiplication of bacteria, Different beneficial and harmful microorganisms in relation to food preservation and spoilage, industrial bacteriology and food fermentation.

### **Text Books**

1. Mal, B. C. (2016). *Introduction to soil and water conservation engineering* (2nd ed.). Kalyani Publishers.
2. Suresh, R., & Sanjay, K. (2018). *Farm power and machinery engineering* (2nd ed.). Standard Publishers and Distributors.
3. Sahay, K. M., & Singh, K. K. (2019). *Unit operations of agricultural processing* (2nd ed.). Vikas Publishing House.

### **Reference Books**

1. Jain, S. C., & Philip, G. (2019). *Farm machinery: An approach* (2nd ed.). Standard Publishers and Distributors.
2. Michael, A. M. (2021). *Irrigation: Theory and practice* (2nd ed.). Vikas Publishing House.
3. Michael, A. M., & Ojha, T. P. (2017). *Principles of agricultural engineering* (Vols. 1 & 2, Rev. ed.). Jain Brothers.

**END SEMESTER EXAMINATION - MODEL QUESTION PAPER**  
(STC 2025 SCHEME)

|                       |                                                 |
|-----------------------|-------------------------------------------------|
| <b>Course Code</b>    | <b>25MAGT301</b>                                |
| <b>Course Name</b>    | <b>INTRODUCTION TO AGRICULTURAL ENGINEERING</b> |
| <b>Max. Marks: 60</b> | <b>Duration: 2.5 Hours</b>                      |

| <b>Part A</b>                                                                         |                                                                                                                                     |              |           |           |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------|
| <i>(Answer all questions. Each question carries 3 marks)</i>                          |                                                                                                                                     |              |           |           |
| <b>Qn No.</b>                                                                         | <b>Question</b>                                                                                                                     | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
| 1.                                                                                    | Explain the major divisions of Agricultural Engineering.                                                                            | 3            | CO1       | L2        |
| 2.                                                                                    | State the importance of farm mechanization in modern agriculture.                                                                   | 3            | CO1       | L2        |
| 3.                                                                                    | Explain the need for and methods of irrigation.                                                                                     | 3            | CO2       | L2        |
| 4.                                                                                    | Explain the engineering measures for control of water erosion.                                                                      | 3            | CO2       | L2        |
| 5.                                                                                    | Classify farm machines used for seed-bed preparation.                                                                               | 3            | CO3       | L2        |
| 6.                                                                                    | Explain the basic parts of a power tiller.                                                                                          | 3            | CO3       | L2        |
| 7.                                                                                    | Explain the biochemical reactions involved in food processing.                                                                      | 3            | CO4       | L2        |
| 8.                                                                                    | List the general methods of food preservation.                                                                                      | 3            | CO4       | L2        |
| <b>Part B</b>                                                                         |                                                                                                                                     |              |           |           |
| <i>(Answer any one full question from each Module. Each question carries 9 marks)</i> |                                                                                                                                     |              |           |           |
| <b>Module I</b>                                                                       |                                                                                                                                     |              |           |           |
| <b>Qn No.</b>                                                                         | <b>Question</b>                                                                                                                     | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
| 9                                                                                     | Explain the scope and importance of Agricultural Engineering as a discipline and the employment sectors for agricultural engineers. | 9            | CO1       | L2        |
| <b>OR</b>                                                                             |                                                                                                                                     |              |           |           |
| 10                                                                                    | Explain the need and strategy for farm mechanization in Indian agriculture.                                                         | 9            | CO1       | L2        |
| <b>Module II</b>                                                                      |                                                                                                                                     |              |           |           |
| <b>Qn No.</b>                                                                         | <b>Question</b>                                                                                                                     | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
| 11                                                                                    | Explain the soil-plant-water relationship and the different methods of irrigation.                                                  | 9            | CO2       | L2        |
| <b>OR</b>                                                                             |                                                                                                                                     |              |           |           |
| 12                                                                                    | Explain the types and needs of drainage systems and the working of a centrifugal pump.                                              | 9            | CO2       | L2        |
| <b>Module III</b>                                                                     |                                                                                                                                     |              |           |           |
| <b>Qn No.</b>                                                                         | <b>Question</b>                                                                                                                     | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
| 13                                                                                    | Explain the classification of farm machines and the machines used for primary and secondary tillage.                                | 9            | CO3       | L2        |
| <b>OR</b>                                                                             |                                                                                                                                     |              |           |           |
| 14                                                                                    | Explain the fuel, air supply, cooling and lubricating systems of a tractor IC engine.                                               | 9            | CO3       | L2        |

| <b>Module IV</b> |                                                                                                              |              |           |           |
|------------------|--------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------|
| <b>Qn No.</b>    | <b>Question</b>                                                                                              | <b>Marks</b> | <b>CO</b> | <b>BL</b> |
| 15               | Explain the engineering properties of food and the biochemical reactions involved in processing and storage. | 9            | CO4       | L2        |
| <b>OR</b>        |                                                                                                              |              |           |           |
| 16               | Explain the classification of microorganisms and their role in food preservation and spoilage.               | 9            | CO4       | L2        |

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