

<b>INSTITUTE</b>	<b>FACULTY OF AGRICULTURE</b>
<b>PROGRAM</b>	<b>BACHELOR OF SCIENCE (Hons.) AGRICULTURE</b>
<b>SEMESTER</b>	<b>2</b>
<b>COURSE TITLE</b>	<b>MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT</b>
<b>COURSE CODE</b>	<b>16AS0202</b>
<b>COURSE CREDITS</b>	<b>3</b>

**Objective:**

- 1 To create the awareness of the students about soil of India and soil fertility.
- 2 To provide knowledge regarding fertilizer management and fertilizer control order.

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

- 1 Students will be able to know the requirements of manures and fertilizers for various crops and their proper time of application.
- 2 Students will be able to know how the soil fertility and productivity can be maintained for better crop production.
- 3 Students will be able to know the management of different types of soil.
- 4 Students will be able to know the application of different fertilizer on different season.

**Pre-requisite of course:** To Create the Awareness of the students about soil fertility and fertilizer Management.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
2	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Classification and importance of organic manures, properties and methods of preparation of bulky manures.</b> Classification and importance of organic manures, properties and methods of preparation of bulky manures.	2
2	<b>Green/leaf manuring. Transformation reactions of organic manures in soil and importance of C:N ratio in rate of decomposition.</b> Green/leaf manuring. Transformation reactions of organic manures in soil and importance of C:N ratio in rate of decomposition.	2
3	<b>Integrated nutrient management</b> Integrated nutrient management	2

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
4	<b>Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary and micronutrient fertilizers, complex fertilizers, nano fertilizers.</b> Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary and micronutrient fertilizers, complex fertilizers, nano fertilizers.	2
5	<b>Soil amendments, fertilizer storage and fertilizer control order</b> Soil amendments, fertilizer storage and fertilizer control order	2
6	<b>History of soil fertility and plant nutrition. Criteria of essentiality</b> History of soil fertility and plant nutrition. Criteria of essentiality	2
7	<b>Role, deficiency and toxicity symptoms of essential plant nutrients</b> Role, deficiency and toxicity symptoms of essential plant nutrients	2
8	<b>Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.</b> Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.	2
9	<b>Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.</b> Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.	2
10	<b>Soil fertility evaluation and soil testing</b> Soil fertility evaluation and soil testing	2
11	<b>Critical levels of different nutrients in soil</b> Critical levels of different nutrients in soil	2
12	<b>Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants.</b> Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants.	2
13	<b>Methods of fertilizer recommendations to crops</b> Methods of fertilizer recommendations to crops	2
14	<b>Factors influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions</b> Factors influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions	2
<b>Total Hours</b>		<b>28</b>

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	<b>Determination of moisture and organic matter content from manures samples</b> Determination of moisture and organic matter content from manures samples	2
2	<b>Estimation of N, P, K, and S from manure samples</b> Estimation of N, P, K, and S from manure samples	2
3	<b>Determination of N from urea fertilizers</b> Determination of N from urea fertilizers	2
4	<b>Determination of NH<sub>4</sub>- N, NO<sub>3</sub>-N from nitrogenous fertilizers.</b> Determination of NH <sub>4</sub> - N, NO <sub>3</sub> -N from nitrogenous fertilizers.	2
5	<b>Determination of P from phosphatic fertilisers</b> Determination of P from phosphatic fertilisers	2
6	<b>Determination of K from potassic fertilisers</b> Determination of K from potassic fertilisers	2
7	<b>Determination of S from sulphur fertilisers</b> Determination of S from sulphur fertilisers	2
8	<b>Estimation of available N, P, K, S and micro nutrient ( Fe, Mn, Zn, Cu ) from soil samples.</b> Estimation of available N, P, K, S and micro nutrient ( Fe, Mn, Zn, Cu ) from soil samples.	2
<b>Total Hours</b>		<b>16</b>

### Textbook :

- 1 NA, NA, NA, NA

### References:

- 1 Manures and fertilizers, Manures and fertilizers, Das P. C., Kalyani Publishers Pvt. Ltd., 2015
- 2 Practical manual for Agril. Chemistry, Practical manual for Agril. Chemistry, Gupta A. K. and Varshney M. L., Kalyani Publishers Pvt. Ltd., 2015
- 3 Soil Fertility Management, Soil Fertility Management, Nagornny V. D. and Raghav J. S., Kalyani Publishers Pvt. Ltd., 2015

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
25.00	25.00	20.00	10.00	10.00	10.00

**Instructional Method:**

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-rooms
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.