Semester	III	Total Credit	4
Course Code	GE 301	Credit Pattern	L-45, T-15, P-0
Course Title	SUSTAINABLE AGRICULTURE		

Course Objectives After completion of this course students will have capacity to	
1	Understand the concept and importance of sustainability with relation to current social, economic, and technical challenges and opportunities in sustainable food production. Develop an appreciation for the impacts of agriculture on natural resources, energy, environment, and climate change and related solutions for these issues.
2	Appreciate the importance and concept of soil health management for healthy food production, efficient water use through appropriate irrigation method and rainwater harvesting.
3	Become familiar with crop protection using physical, cultural, biological methods to prevent & manage pests and implement integrated approach in pest management (IPM) to avoid chemical use of hazardous chemical pesticide use.
4	Apply scientific concepts and practices in fertilizer management and propose integrated approach in plant nutrient management (IPNM), Learn how effectively plan organic production systems, maintain and use records.

Course Outcomes:	
1.	After studying this paper, students will learn importance of agriculture for tropical developing countries like India. They will learn agri-ecosystem & its components. They will know the essential features of traditional, transitional & modern agriculture. They will learn importance of biodiversity in agri-ecosystem.
2.	They will be aware of Irrigation water quality & requirements. They will know Water management for sustainability. They will understand importance of soil & land resource, methods of soil & water conservation.
3.	They should be able to understand & apply many ecological Principles in Soil Health Management & Pest Management through Integrated Approach. They can propose IPNM & IPM concepts..
4.	They will be able to understand the importance of Biodiversity in agri-ecosystem & remedial measures required for restoration, so they can propose concept of Organic Farming.

Syllabus:

Unit Number	Contents	Number of Sessions	
1	Importance of Agriculture for Tropical Developing Countries Essential Features of Agriculture/ Crop Production Branches of Agriculture, Factors affecting Modern Crop production Methods of Propagation, Concept & Quality of Seeds Weather, Climate & Agriculture, Agricultural Production Systems-Environmental Impacts of Monoculture & Polyculture/Multiple Cropping ,Crop Rotation Crop Farms as Agro-ecosystem.	L= 11 T=2	P= 2
2	Irrigation Water Management for Profitability, Soil &Water Conservation , Systems & Methods of Irrigation- Surface, Subsurface & Micro-irrigation,their Advantages & Disadvantages	L= 12 T= 2	P= 1

	Environmental Consequences of Unskilled Irrigation practices, Irrigation Water Quality-Salt Contents & Sodium Absorption Ratio(SAR), Irrigation Scheduling & Agricultural Drainage Systems		
3	Agricultural Pest Management Concept of Plant Diseases & Pest, Classification of Plant Diseases & Disease Triangle, Methods of Pest Management-Biological, Cultural, Legislative, Physical & Chemical, (Chlorinated Hydrocarbons, Organophosphates & Carbamates), Pesticide use & Environment, Organic Crop Production , Agroforestry, Integrated Pest Management (IPM) & Bio-pesticides.	**L= 11** **T= 2**	**P= 2**
4	Sustainable Farming, Concept of Soil Health Management Concept of Ecological Pest & Disease Management- Energy Crops, Fertilizers & Their Management Nutrition & Essential Plant Nutrient Elements,Classification of Fertilizers & Manures,Advantages & Disadvantages, Environmental Consequences, Impacts of Synthetic Fertilizer Use, Concept of Integrated Plant Nutrient Management(IPNM), Concept & importance of Bio-fertilizers, Types, Preparation & Use.	**L=11** **T= 2**	**P= 2**

Learning Resources		
1	**Text Books**	• A Text book of Agricultural Biotechnology, Ahindra Nag, PHI • A Text book of Extension Education, S V Supe, ATPA • A Textbook Of Environmental Studies, Dr D K Asthana, S. Chand Publishers, 2018 • A Text Book Of Environmental Studies by Vijay Tiwari, Himalaya Publishers, 2017 • A Text Book of Green Chemistry, Ahluwalia, Narosa
2	**Reference books**	• Principles of Crop Production- Theory, techniques &Technology George Aquaah, Prentice-Hall India-2005 • Evironmental Science-A Study of Interrelationships Enger Smith, Mc-Graw Hill Publication,6th Ed.-1997 • Agronomy, Soil , Plant & Water Relationships Vaidya , Khuspe & Sahastrabuddhe • Fundamentals Of Agriculture Vol. 2 Paperback, 2012, by Katyayan Jain Brothers, 7th Edition, 2017 • Fertilizer Technology and Management Paperback, 2012, Mishra Brahma (Author) I K International Publishing House Pvt. Ltd; First Edition • Management of Horticultural Crops, T. Pradeepkumar, New India Publishing, 2008 • Integrated Pest Management: Volume 2: Dissemination and Impact, Editors Rajinder Peshin, Ashok K. Dhawan, Springer Science & Business Media, 2009 • Nature & Properties of Soil, Nyle Brady, 2005 • Soil, Land & Food, Managing the Land duringthe twenty-first century by Alan Wild, Cambridge University Press., 2003

3	**Websites**	• https://www.icrisat.org • https://icar.org.in • https://www.mssrf.org
4	**Journals**	• Current Science, ISSN No. 0011-3891 • Every Thing About Water • Down to Earth • Resonance, ISSN No. 0971-8044 • Journal of Earth System Science, ISSN No .2253-4126
5	**Supplementary Reading**	• Chinimandi.com • Sugar Cooperatives Magazine
6	**Practical Components**	• Field visit to Agricultural Research Station, Organic Farming.