Semester Lecture Plan (Theory)

Name of the college: Government College of Arts, Science and Commerce, Sanquelim		
Name of Faculty: Dr. Tanvi Nitin Prabhu	**Subject:** Botany	
Paper code: BOT 204	**Program/Course: B.Sc (Botany)**	**Division: A**
Academic Year: 2025-26	**Semester: IV**	**Total Lectures: 30**
Course Objectives: 1. Introduce the concept of biofertilizers and elucidate the benefits of their application. 2. Provide knowledge about the various types of biofertilizers and the organisms used in their formulations 1. Familiarise students with the principles and practices of organic farming and its role in sustainable crop production.		
Expected Course Outcome: 1. Recall the concept of biofertilizers. 2. Explain the types of biofertilizers, isolation, mass multiplication, formulations and methods of field application and benefits associated with use of biofertilizers in organic agriculture. 3. Develop skills in preparation of biofertilizer formulations for management of crops in a cost-effective and eco-friendly manner. 4. Integrate the acquired knowledge for sustainable crop production, welfare of society and employment generation.		

Student Learning Outcome:

1. Recall the concept of biofertilizers.
2. Explain the types of biofertilizers, isolation, mass multiplication, formulations and methods of field application and benefits associated with use of biofertilizers in organic agriculture.
3. Develop skills in preparation of biofertilizer formulations for management of crops in a cost-effective and eco-friendly manner.
1. Integrate the acquired knowledge for sustainable crop production, welfare of society and employment generation.

Month	Lectures		No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
	From:	To:					
December 2025	01.12.2025	06.12.2025	03	Concept of biofertilizers Types of microbes used as biofertilizers Carrier materials - types and quality characteristics of an ideal carrier;		Chalk and Board/PPT	Dubey, RC (2005). A Text Book of Biotechnology. S. Chand & Company, New Delhi.
December 2025	08.12.2025	13.12.2025	03	Role of effective microorganisms and Plant Growth Promoting Rhizobacteria (PGPR) and their mode of action Benefits and limitations of usage of biofertilizers. Occurrence, isolation, mass production and field application of PGPR		Chalk and Board/PPT	Dubey, RC (2005). A Text Book of Biotechnology. S. Chand & Company, New Delhi.
December 2025	15.12.2025	20.12.2025	00	**Tarang 2025, Liberation day, Elections**			

December 2025	22.12.2025	27.12.2025	02	Occurrence, isolation, mass production and field application of PGPR Field application of PGPR		Chalk and Board/PPT	
December 2025 – January 2026	29.12.2025	03.01.2026	01	Types of mycorrhizal association and their characteristics		Chalk and Board/PPT	Bukhari, MJ and Rodrigues, BF (2006). Techniques in Mycorrhizae. Government College, Quepem, Goa.
January 2026	05.01.2026	10.01.2026	03	Arbuscular Mycorrhizal (AM) fungi - isolation, mass production and field application. Arbuscular Mycorrhizal (AM) fungi - isolation, mass production and field application. Ectomycorrhizae as biofertilizers		Chalk and Board/PPT	Bukhari, MJ and Rodrigues, BF (2006). Techniques in Mycorrhizae. Government College, Quepem, Goa.
January 2026	12.01.2026	17.01.2026	03	Significance of mycorrhizae in forestry and agriculture; **ISA 01** Rhizobium-root nodule symbiosis		Chalk and Board/PPT	
January 2026	19.01.2026	24.01.2026	03	Rhizobium - identification, isolation, mass multiplication, Production of carrier-based inoculants, techniques of field application and crop response to rhizobial inoculants		Chalk and Board/PPT	

				Production of carrier-based inoculants, techniques of field application and crop response to rhizobial inoculants			
January 2026	26.01.2026	31.01.2026	02	Frankia and actinorrhizal symbiosis Azolla-Anabaena symbiosis		Chalk and Board/PPT	
February 2026	02.02.2026	07.02.2026	03	Mass cultivation and field application of Azolla and its role as a green manure-cum-biofertilizer. Cyanobacteria - diversity, identification Cyanobacteria - isolation		Chalk and Board/PPT	
February 2026	09.02.2026	14.02.2026	03	Inoculum preparation, techniques of field application and crop response to cyanobacterial inoculants. **ISA 02** Azospirillum and Azotobacter -identification, isolation.		Chalk and Board/PPT	
February 2026	16.02.2026	21.02.2026	03	Azospirillum and Azotobacter - mass multiplication. Production of carrier-based inoculants, techniques of field application and crop response Algalization technology		Chalk and Board/PPT	
February 2026	23.02.2026	28.02.2026	03	Principle, need and benefits of organic farming Crop rotation and its advantages		Chalk and Board/PPT	Dubey, RC (2005). A Text Book of Biotechnology. S.

				Types of manure - green manure, farmyard manure			Chand & Company, New Delhi.
March 2026	02.03.2026	07.03.2026	02	Neem-coated urea, panchagavya vermicomposting – method, advantages and disadvantages.		Chalk and Board/PPT	
March 2026	09.03.2026	14.03.2026	03	vermicomposting – method, advantages and disadvantages. Introduction to FCO (Fertilizer Control Order) ISA 03		Chalk and Board/PPT	
March 2026	16.03.2026	21.03.2026	02	Standard parameters for quality control; quality management procedures; Storage conditions and shelf life of biofertilizers		Chalk and Board/PPT	
March 2026	23.03.2026	28.03.2026	03	Government support and programmes. Role of National Centre of Organic Farming. Biofertilizers for sustainable agriculture, nanotechnology in biofertilizers		Chalk and Board/PPT	
March 2026-April 2026	30.03.2026	04.04.2026	02	Selection of competitive and multi-functional biofertilizers – case study of *Piriformospora indica*. Revision		Chalk and Board/PPT	

Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
ISA 3	7.5
Practical	25
Project	NA
Semester End Exam	60