PG MICROBIOLOGY

PCMBB20: FOOD, AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: I	PCMBB20	Food, Agriculture and Environmental Microbiology	Theory	Core	6	5	100

Course Objective: To make the students familiarize on Food, Agriculture and Environmental aspects of Microbiology.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Analyse the principles in food preservation.

CO2: Communicate diseases associated with food.

CO3: Discuss the role of microorganisms in soil and microbial interaction.

CO4: Utilize the knowledge on biogeochemical cycles to produce biofertilizers.

CO5: Assess information about microbiological quality of air and water.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	M	L	H	M
CO2	H	L	L	M	L	H
CO3	H	H	M	H	L	H
CO4	H	L	L	M	M	H
CO5	H	H	M	H	L	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	M	L	H	M
CO2	H	M	M	L	L	H
CO3	H	H	M	H	L	H
CO4	H	L	L	L	M	H
CO5	H	H	M	H	L	H

H – HIGH (3)

M – MODERATE (2)

L – LOW (1)

COURSE SYLLABUS

UNIT-I: Food Microbiology. (15 hours)

1.1 Importance of studying Food microbiology- Primary sources of microorganisms in foods. (K1,K2)
1.2 Factors influencing microbial growth in foods - extrinsic and intrinsic.(K1,K2)
1.3 Principles of food preservation - preservation methods - irradiation - drying, heat processing, chilling and freezing, high pressure, modification of atmosphere and chemical preservatives. (K1,K2,K3,K4)
1.4 Nutritional value of fermented foods. (K2,K3,K4,K5,K6)
1.5 SCP and their uses. (K1,K2,K3)
1.6 Contamination, preservation and spoilage of fruits, vegetables, meat and poultry products. (K1,K2,K3)

UNIT-II: Dairy Microbiology. (15 hours)

1.1 Microbiology of fermented milk - Starter lactic cultures (K1,K2)
1.2 Fermented milk products (cheese, yoghurt, acidophilus milk, kefir, kumis). (K1,K2,K3)
1.3 Food sanitation in food manufacture and in the retail trade. (K1,K2,K3)
1.4 (HACCP) - Food control agencies and its regulations. (K1,K2,K3)
1.5 Food borne disease.(K1,K2)
1.6 Milk borne diseases. (K1,K2)

UNIT-III: Soil Microbiology. (15 hours)

1.1 Distribution of soil microorganisms in soil. (K1,K2)
1.2 Factors influencing the soil microflora. (K1,K2)
1.3 Role of microorganisms in soil fertility. (K1,K2)
1.4 Interactions among microorganisms, mutualisms, commensalism, competition, amensalism, parasitism, predation. (K1,K2)
1.5 Interactions between microbes and plants - rhizosphere, phyllosphere. (K1,K2)
1.6 Mycorrhizae, root nodule bacteria. (K1,K2,K3,K4)

UNIT-IV: Biogeochemical cycle and Biofertilizers. (15 hours)

4.1 Biogeochemical - carbon cycle - role of microbes in carbon cycle.(K1,K2)
4.2 Nitrogen cycle - mechanism of biological nitrogen fixation - ammonification - nitrification - denitrificatioin and microorganisms involved in such processes. .(K1,K2)
4.3 Phosphorous cycle. .(K1,K2)
4.4 Sulphur cycle. (K1,K2)
4.5 Biofertilizer for sustainable agriculture *Rhizobium, Azospirillium, Azotobacter*.(K1,K2,K3,K4)
4.6 *Azolla*, BGA -mass production methods - applications methods and crop response of biofertilizers.(K1,K2,K3,K4)

UNIT-V: Aero Microbiology and Aquatic Microbiology. (15 hours)

5.1 Droplet, Droplet nuclei and Aerosol. (K1,K2)
5.2 Assessment of air quality. (K2,K3,K4)
5.3 Airborne diseases, their symptoms and preventive measures, water borne disease.(K1,K2)

5.4 Types of water – Assessment of microbiological quality of water.(K2,K3,K4)

5.5 Treatment of municipal water (K4,K5)

5.6 Types of wastes, characterization of solid and liquid waste. Sewage treatment-composting. (K3,K4,K5)

TEXT BOOKS:

1. Frazier W.C. and West Hoff D.C (2008). Food Microbiology. 4th edition. Mc Graw Hill, New York.
2. Joseph C. Daniel (1999). Environmental aspects of Microbiology. 1st edition, Bright Sun publications, Chennai.
3. Subba Rao NS (2004). Soil Microbiology. 4th edition, Oxford and BH Publishing Co.Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Adam M.R. and Moss M.O (2004). Food Microbiology. 2nd edition, New international pvt. Ltd., publishers.UK.
2. Banwart G. J (2004). Basic Food Microbiology. 2nd edition, CBS Publishers and Distributors, New Delhi.
3. James M. Jay (2003). Modern Food Microbiology. 4th edition, CBS Publishers, New Delhi.
4. Vijaya Ramesh K (2004). Environmental Microbiology. 1st edition, MJP publishers. Chennai.
5. Singh D.P and Dwivedi S.K (2005). Environmental Microbiology and Biotechnology. 1st edition, New Age International (P) Ltd., New Delhi.
6. Mishra RR (2004). Soil Microbiology. 1st edition, CBS Publishers and distributors, New Delhi.
7. Rangaswami G and Mahadevan A (2002). Disease of Crop Plants in India. 4th edition, PHI Learning (P) Ltd., New Delhi.
8. Atlas R.M. and Bartha R (1992). Microbial Ecology, Fundamental and Application, 3rd edition, Bengamin and Cummings. United States.

OER:

1. http://www.loc.gov/
2. http://library.clark.edu/
3. http://www.dli.ernet.in/
4. http://www.loc.gov/education/