

**St. Aloysius College (Autonomous), Jabalpur, M.P.**

**Department of Microbiology**

**Department of Higher Education, Govt. of M.P.**

**Under Graduate Annual Pattern Syllabus**

**Session 2022- 2023**

**As recommended by Central Board of Studies and approved by the Governor**

**Class: B.Sc.**

**Subject: Industrial Microbiology**

**Paper: II - Agricultural, Environmental and Industrial Microbiology**

**Max. Marks: 40(TH.)+10 (CCE) = 50**

**Course outcome:** Student will learn techniques regarding microbial analysis of food samples and dairy products. Information regarding microbial food poisoning. Industrial and municipal waste water treatment, production of single cell protein makes the student efficient to start enterprise at pilot scale level. The students will understand different types of environments and habitats where microorganisms grow including the microbiomes of the human gut and animal gut

**UNIT -I : BIOFERTILIZERS AND BIOPESTICIDES :-**

**Biofertilizer :-** Industrial production of *Rhizobium*, *Azotobacter*, , Cyanobacteria, Mycorrhizae - VAM and phosphate solubilizing bacteria

**Biopesticides :-** Production of bacterial, viral and fungal biopesticides, microbial warfare on plants.

**UNIT -II : BIOREMEDIATION AND BIOLEACHING :-**

**Management of Industrial waste-** textile, pharmaceutical and dairy industry.

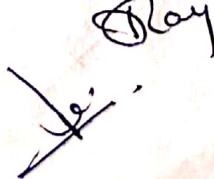
**Management of agricultural waste.**

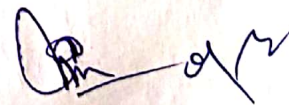
**Management of Municipal waste-** Primary, Secondary and Tertiary treatment, Microorganisms in Composting, Bioleaching of copper and gold.

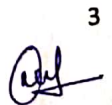
**UNIT-III : METABOLITES PRODUCTION :-**

**Industrial production of organic acids, enzymes (amylase and protease), solvents (acetone, ethanol and glycerol), Vitamins (B12 and riboflavin), Antibiotics (Penicillin and Streptomycin)**









#### UNIT -IV : FOOD AND DAIRY MICROBIOLOGY :-

Microbial role in production of bread, cheese, butter, yoghurt, cultured buttermilk, condensed and dry milk products, Indian fermented foods.

#### UNIT - V: BIOFUEL AND MICROBIAL FOODS :-

Biofuel:-Microorganism used, fermentation condition, recovery, production and uses of hydrogen, ethanol and biogas

SCP:- Production of SCP (Algae and Bacterial); Product quality, merits and demerits.

Mushroom Production ( long and short method ) and harvesting.

#### Text & Reference Books:

1. Casida, L.E 1968. Industrial Microbiology. Willey, New York; London.
2. Doyle, M.P. Beuchat, L.R. and Montville, T. J. 2001. Food microbiology: Fundamentals and Frontiers. 2<sup>nd</sup> edition ASM Press, Washington, D.C.
3. Frazier, W.C.. and Westhoff, D.C. 2004. Food microbiology. Tata McGraw Hills Publishing Company Limited.
4. Rose, A.H. 1983. Food microbiology, Academic Press, London
5. Garbutt, J.H. 1997. Essentials of food microbiology. Arnold, London.
6. Wood, B.J.B. 1998. Microbiology Of Fermented Foods. 2<sup>nd</sup> edition. Blackie academic and professional, London
7. Prajapati J.B. 1995. Fundamentals of Dairy Microbiology
8. R.C. Dubey A textbook of Biotechnology.
9. R. P. Singh. A textbook of Microbiology.

Handwritten signatures and initials in purple ink, including "SW", "Day", "R.C.", and "R.P.S.".