ST.JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

IV SEMESTER **BIOTECHNOLGY** TIME: 4 HRS/WEEK BTH 4704 (3) **ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY** MAX.MARKS:100 w.e.f. 2020-21 (AH Batch) **SYLLABUS**

**OBJECTIVES:** To enable the students to -

* Understand the role of biotechnology in industries.
* Know the use of microbes in the preparations of food and dairy product.
* Understand the role of biotechnology in the environment such bioremediation.

**COURSE OUTCOMES: Students will**

* **CO1:** Get the insight about the function and organization of industry.
* **CO2:** Be trained for industrial solvents production, with acquired basic design & fermenter operation. Also skilful in verification of protocols for dairy.
* **CO3:** Be proficient on health care products. Also be familiarized in generation and protection of patents, copyrights and trademarks.
* **CO4:** Be appraising the importance of enhancing the green and cleanenvironment.
* **CO5:** Be familiarize with microbial action on crop productivity.

**UNIT – I: POLLUTION TYPES AND CONTROL :**

1. Environmental Biotechnology-Environmental Pollution: Types of pollution-air pollution & its control through Biotechnology,
2. Bio-filters, bio-scrubbers, bio-trickling filter.
3. Water pollution and its management: Measurement of water, pollution, sources of water pollution.
4. Microbiology of waste water treatment, aerobic processes, activated sludge, oxidation ponds, trickling filters,and rotating biological contactors. Anaerobic processes: Anaerobic digesters, upward flow anaerobic sludge blanket reactors.

**UNIT-II: BIOREMEDIATION :**

1. Biodegradation and Bioremediation – Concepts & principles of Bioremediation bioremediation of hydrocarbons and its applications
2. Degradation of pesticides and other toxic chemicals by microorganism.
3. Role of geneticallyengineered microbes, Concept of phyto-remediation,environmental safety guidelines.

**UNIT III: BIO-FUELS :**

1. Bio fuels: bio ethanol and biodiesel, microbial groups involved in bio-fuel production & interactions.
2. Factors affecting bio-fuel production,
3. Bio-fertilizers, vermiculture.

**UNIT IV: BASIC PRINCIPLES OF MICROBIAL TECHNOLOGY :**

1. Industrially important microbes, its screening, selection and identification.
2. Maintenance and preservation of industrially important microbial cultures. Strain Improvement,
3. Basic concepts of fermentation:types of fermenters, Design of fermenters and applications.

**UNIT V: COMMERCIAL PRODUCTION OF MICROBIAL PRODUCTS**

1. Microbial technology products and applications.
2. Microbial production of Organic acids (Lactic acid, citric acid), Amino acids(Glutamicacid, Aspartic acid and Lysine).
3. Fermentation by microbes for food additives: dairy products (Cheese, Yogurt), beverages (Beer,Wine) and antibiotics (Streptomycin, Pencillin)

**REFERENCES:**

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Techniques, 2005,MJP Publishers

1. Environmental microbiology by Raina M.Maier Ian L.Pepper& Charles P.Gerba,2000,Academic press
2. Environmental Chemistry, A.K. De. Wiley Eastern Ltd.,2001, New Delhi
3. Introduction of Biodeterioration, D. Allsopp and K.J. Seal, ELBS/Edward Arnold,2008
4. Power un seen: How microbes rule the world. By Dixon, B. Freeman/ Spectrum, 1994,Oxford.
5. Environmental Microbiology. By. Mitchell. R. Wiley,1992, New York
6. Introduction to Environmental Sciences, Y. Anjaneyulu ,2004, BS Publications
7. Industrial Microbiology by A.H.Patel,2009
8. Prescott & Dum (2002) Industrial Micrbiology, Agrabios (India) ,2005,Publishers
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