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

IV SEMESTER **BIOTECHNOLGY** TIME: 4 HRS/WEEK BTH 4704 (3) **ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY**MAX.MARKS:100w.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:**

1. K. Vijaya Ramesh, Environmental Microbiology, 2004,MJP Publishers, Chennai.
2. A.G. Murugesan, C. Raja Kumari, Environmental Science & Biotechnology - Theory &

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
9. Creueger W. &Crueger A.A Text of Industrial Microbiology,2000, 2nd Edition, Panima Publishers corp.

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

IV SEMESTER **BIOTECHNOLGY** TIME: 2 HRS/WEEK BTH 4754 (2) **ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY** MAX.MARKS: 50 w.e.f. 2020-21 (AH Batch) **PRACTICAL**

**OBJECTIVE:**To enable the student to apply the different principles of Biotechnology in the preparation of different industrial products.

**COURSE OUTCOMES: Students will**

* **CO1:** Get hands-on training to produce industrial beverages on a productive scale.
* **CO2:** Proficient in checking the quality of industrial beverages and water.
* **CO3:** Expertise in the area of soil fertility and known about plant-microbe

interactions.

**COURSE:**

1. Detection of coliforms for determination of the purity of potable water.
2. Determination of total dissolved solids of water
3. Determination of Hardness and alkalinity of water sample.
4. Determination of dissolved oxygen concentration of water sample
5. Determination of biological oxygen demand of sewage sample
6. Determination of chemical oxygen demand (COD) of sewage sample.
7. Isolation of industrially important microorganisms from soil.
8. Isolation of amylase producing organisms from soil.
9. Production of α – amylase from Bacillus Spp. by shake flask culture.
10. Production of alcohol or wine using different substrates.
11. Estimation of citric acid by titrimetry.

**REFERENCES:**

* + - 1. K. Vijaya Ramesh, Environmental Microbiology, 2004,MJP Publishers, Chennai.
      2. A.G. Murugesan, C. Raja Kumari, Environmental Science & Biotechnology - Theory &Techniques, 2005,MJP Publishers
      3. Environmental microbiology by Raina M.Maier Ian L.Pepper& Charles P.Gerba,2000,Academic press
      4. Environmental Chemistry, A.K. De. Wiley Eastern Ltd.,2001, New Delhi
      5. Introduction of Biodeterioration, D. Allsopp and K.J. Seal, ELBS/Edward Arnold,2008
      6. Power un seen: How microbes rule the world. By Dixon, B. Freeman/ Spectrum, 1994,Oxford.
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