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

IV SEMESTER **BIOTECHNOLGY** TIME: 4 Hrs/ Week

BTH 4704 (3) **ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY**

W.e.f. 2020-21 admitted batch (20AH) Max. Marks: 100

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 clean environment.
- **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 genetically engineered 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 (Glutamic acid, 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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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.
7. Environmental Microbiology. By. Mitchell. R. Wiley,1992, New York
8. Introduction to Environmental Sciences, Y. Anjaneyulu ,2004, BS Publications
9. Industrial Microbiology by A.H.Patel,2009
10. Prescott & Dum (2002) Industrial Micrbiology, Agrabios (India) ,2005,Publishers
11. Creueger W. & Crueger A.A Text of Industrial Microbiology,2000, 2nd Edition, Panima Publishers corp.

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