Haldia Institute of Technology

Department of Food Technology

COURSE INFORMATION

**Course Code: FT 702**

**Course Name: Waste Management of Food Industries**

**Contacts: 4h (3 lectures & 1 tutorial)**

**Credits: 4**

COURSE OUTCOME

**At the end of this course, the incumbent will be able to:**

FT702.1 Ability to fully **comprehend** food waste, its menace and potentials and treat the menace of industrial food wastes, its production level, disposal and effects.

FT702.2 Ability to **treat** various method of safe disposal of industrial food wastes.

FT702.3 Ability to **design** and **develop** solutions for practical engineering problems related to food industries.

FT702.4 Ability to **understand** impact of waste and its management solutions in society in the context of environment.

FT702.5 Ability to **demonstrate** knowledge and understanding of engineering and management principles.

FT702.6 Ability to **communicate** effectively on professional activities with the engineering community and with the society at large.

PREREQUISITES

**To understand this course, the incumbent must have idea of:**

* Elementary Mathematics
* Biological Organisms

SYLLABI

Module 1:

Introduction: Classification and characterization of food industrial wastes from fruit and vegetable processing industry, beverage industry, fish, meat and poultry industry, sugar industry and dairy industry; Waste disposal methods – physical, chemical and biological; Economical aspects of waste treatment and disposal.

Module 2:

Treatment methods for liquid wastes from food process industries; Design of activated sludge process, Rotating biological contactors, Trickling filters, UASB, Biogas plant.

Module 3:

Treatment methods of solid wastes: Biological composting, drying and incineration; Design of solid waste management system: Landfill digester, Vermicomposting pit.

Module 4:

Biofilters and bioclarifiers, Ion exchange treatment of waste water, Drinking-water treatment, Recovery of useful materials from effluents by different methods.

LECTURE PLAN

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| **LectureNo.** | **Details of coverage** | **Handout, Lecture Notes, Links etc.** |
| 1 | Introduction: Objective of course, Definition of Waste, sewage, effluent. | [Lecture Note1](Lecture%20Note.pdf) |
| 2 | Discussion about different pollutants and polluting methods. | reference book 1,2 |
| 3 | Discussion about different waste material coming out from distilleries, beverage industry, dairy industry. | reference book 1,2 |
| 4 | Different waste material coming out from tanning, fish, meat and poultry processing industry. | reference book 1,2 |
| 5 | Waste material from fruit and vegetable industry. | reference book 1,2 |
| **6** | Biodegradation method: Aerobic and anaerobic. Comparative analysis. | reference book 1,2 |
| **7** | Classification and characterization of food industries waste: alcohol industry waste, poultry processing waste, fruit and vegetable processing waste. | reference book 2 |
| **8** | Classification and characterization of food industries waste: Dairy and sugar industry waste and beverage industry waste. | reference book 3 |
| 9 | Short class test as Assignment 1 |  |
| 10 | Physical, chemical and biological methods of waste disposal. | reference book 1,2 |
| 11 | Economic aspects and sources of waste material. | reference book 3,4 |
| 12 | Discussion about different treatment methods of waste. | reference book 2,3 |
| 13 | Comparison between different treatment methods. | reference book 2,3 |
| 14 | General concept of Activated sludge process method. | reference book 1,2 |
| 15 | Design of Activated sludge process method | reference book 1,2 |
| 16 | Solved problems regarding ASP | Reference book 1,2 |
| 17 | General concept of RBC method. | reference book 1,2 |
| 18 | Design of RBC | reference book 1,2 |
| 19 | Solved problems regarding RBC | reference book 1,2 |
| 20 | Short Class Test as Assignment 2 |  |
| 21 | General concept of Trickling Filter. | reference book 1,2 |
| 22 | Design of trickling Filter | reference book 1,2 |
| 23 | Solved problems regarding TF | reference book 1,2 |
| 24 | Problem regarding ASP,RBC and TF | Reference book 1,2 |
| 25 | General concept of UASB method. | reference book 1,2 |
| 26 | Design of UASB | reference book 1,2 |
| 27 | Solved problems regarding UASB | reference book 1,2 |
| 28 | Short class test as Assignment 3 |  |
| 29 | General concept about Solid waste treatment method | reference book 2,3 |
| 30 | Discussion on different types of method | reference book 2,3 |
| 31 | Solving problems regarding SWTM | Reference book 2,3 |
| 32 | General discussion about biological composting. | reference book 1,2 |
| 33 | Design criteria of biological composting. | reference book 1,2 |
| 34 | Problems regarding Aerobic biological composting. | reference book 1,2 |
| 35 | Problems regarding Anaerobic biological composting. | reference book 1,2 |
| 36 | Short class test as Assignment 3 | Study Material |
| 37 | Discussion about pyrolysis, incineration and gasification. | reference book 1,2 |
| 38 | Problems related with pyrolysis and incineration. | reference book 1,2 |
| 39 | General concept about landfill digester. | reference book 1,2 |
| 40 | General concept about vermicomposting. | reference book 1,2 |
| 41 | Design aspects of vermicomposting. | ,reference book 1,2 |
| 42 | Discussion about biofilters and bioclarifiers. | reference book 1,2 |
| 43 | Different Treatment method of drinking water. | reference book 1,2 |
| 44 | Short class test as Assignment 4 |  |
| 45 | Doubt clearing class |  |
| 46 | Ion exchange treatment method of waste water. | reference book 1,2,3 |
| 47 | Discussion on Recovery of useful materials from effluents by different methods. | reference book 1,2,3 |
| 48 | Recapitulation and thoroughly discussion on topic |  |

RECOMMENDED READINGS

**TEXT**

1. Environmental Biotechnology: Principles and Applications; Rittmann BE & McCarty PL; 2001, Mc-Grow-Hill International editions.

2. Environmental Biotechnology; Bhattacharyya B C & Banerjee R; Oxford University Press.

3. Food Processing Waste Management; Green JH & Kramer A; 1979, AVI.

**REFERENCE**

1. Food Industry Wastes: Disposal and Recovery; Herzka A & Booth RG; 1981, Applied Science Pub Ltd.

2. Water & Wastewater Engineering; Fair GM, Geyer JC & Okun DA; 1986, John Wiley & Sons, Inc.

3. Wastewater Treatment; Bartlett RE; Applied Science Pub Ltd.

4. Symposium: Processing Agricultural & Municipal Wastes; Inglett GE; 1973, AVI.