

BIOCHEMICAL PROCESSES IN WASTEWATER TREATMENT

Paper Code: ETEN-303

Paper: Biochemical Processes in Wastewater Treatment

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: This course introduces the students to the principles of biochemical processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as biosolids handling, treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

UNIT – I

Estimating wastewater flow rates, Physical, Chemical and biological characteristics of wastewater, Reactor types, Flow regimes, Application of Material Balance equations for batch, complete mix and plug flow reactor. Introduction to industrial effluent disposal, Wastewater treatment, sludge disposal and reuse, Classification of wastewater treatment methods. Selection of Treatment-process, flow diagrams, Evaluation and selection of design flow rates, Evaluation and selection of design mass loadings. Process selection, elements of conceptual process design.

[T1,T2][No. of Hours: 11]

UNIT – II

Design of facilities for the biological treatment of wastewater: Activated sludge process, Selection and design of physical facilities for activated sludge process, Activated sludge process design, Aerated lagoons, Trickling filters, Rotating biological contractors, Combined aerobic treatment processes, Stabilization ponds.

[T1,T2][No. of Hours: 11]

UNIT – III

Anaerobic processes of treatment, single stage and two stage digestion, upflow anaerobic sludge blanket (UASB) system for treatment of sewage and industrial effluents.

Biological nutrient removal, Removal of nitrogen by biological nitrification/denitrification.

Removal of phosphorous by biological methods, Combined removal of nitrogen and phosphorus by biological methods.

[T1,T2][No. of Hours: 11]

UNIT – IV

Aerobic suspended-growth treatment processes, Aerobic attached - growth treatment processes, Anaerobic suspended - growth treatment processes, anaerobic attached-growth treatment processes, Pond treatment processes.

[T1,T2][No. of Hours: 11]

Text:

- [T1] Metcalf and Eddy, "Wastewater Engineering- Treatment and reuse," Tata McGraw Hill Publishing Company Ltd., New Delhi.
- [T2] Davis M.L., Cornwell D.A., "Introduction to Environmental Engineering", Tata McGraw Hill Education (P) Ltd., New Delhi.

Reference Books:

- [R1] Droste R.L., "Theory and Practice of Water and Wastewater Treatment", Wiley India (P) Ltd.
- [R2] Hammer M.J. and Hammer M.J., Jr., "Water and Wastewater Technology", PHI (P) Ltd., New Delhi.
- [R3] Benefield L.D. and Randall C.W., " Biological Process Design for Waste water Treatment", PHI Learning (P) Ltd., New Delhi.
- [R4] CPHEEO Manual.
- [R5] Peavy H.S., Rowe D.R., Tchobanoglous G., "Environmental Engineering", Tata McGraw Hill Education (P) Ltd., New Delhi.
- [R6] Venkateswarlu K.S., "Water Chemistry, Industrial and Power Station Water Treatment, New Age International Publishers, New Delhi.