III Year - I Semester 20CE5757



SANITARY ENGINEERING

Course Learning Objectives:

The objective of this course is:

- Outline planning and the design of waste water collection, conveyance and treatment systems for a community/town/city
- Provide knowledge of characterization of wastewater generated in a community
- Impart understanding of treatment of sewage and the need for its treatment.
- Summarize the appurtenance in sewerage systems and their necessity
- Teach planning, and design of septic tank and imh off tank and the disposal of the effluent from these low cost treatment systems
- Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers.

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

- Plan and design the sewerage systems
- Suggest a suitable pump for pumping of waste water
- Analyze sewage and suggest and design suitable treatment system for sewage treatment
- Suggest a suitable disposal method with respect to effluent standards.
- Select the appropriate appurtenances in the sewerage systems

SYLLABUS

UNIT I

Introduction to Sanitation– collection and conveyance of waste water–sewerage – classification of sewerage systems-Estimation of sewage flow and storm water drainage – fluctuations–Hydraulics of sewers and storm drains–design of sewers–appurtenances in sewerage –cleaning and ventilation of sewers

UNIT II

Pumping of waste water: Pumping stations– location – components– types of pumps and their suitability with regard to waste waters.

Sewage characteristics–Sampling and analysis of waste water - Physical, Chemical and Biological Examination-Measurement of BOD and COD- BOD equations

UNIT III:

Treatment of sewage: Primary treatment-Screens-grit chambers-grease traps- floatationsedimentation – design of preliminary and primary treatment units.

UNIT IV

Secondary treatment: Aerobic and anaerobic treatment process- comparison. Septic Tanks and Imh off tanks

Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons. **Attached Growth Process**: Trickling Filters-mechanism of impurities removal-classification-design-operation and maintenance problems. RBCs.

UNIT V

Bio-solids (Sludge) management: Characteristics, handling and treatment of sludgethickening– anaerobic digestion of sludge, Sludge Drying Beds. Centrifuge. **Disposal of sewage**: Methods of disposal–disposal into water bodies- disposal on landsewage sickness.

TEXT BOOKS

- 1. Waste water Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
- 2. Industrial Water and Waste water Management, K.V.S.G.Murali Krishna.
- 3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

REFERENCES

- 1. Environmental Engineering, Howard S.Peavy, Donald R.Rowe, Teorge George Tchobanoglus–Mc-Graw-Hill Book Company, New Delhi, 1985
- Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, ShamR Asolekar, Mc-Graw Hill, New Delhi; 3rdEdition
- 3. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S.K., Khanna Publishers
- 4. Sewage treatment and disposal, P. N. Modi & Sethi. Environmental Engineering, Ruth F.Weinerand Robin Matthews–4thEdition Elsevier, 2003