DOON UNIVERSITY, DEHRADUN

Mid Semester Examination, 2014, First Semester
M.Tech. (Environmental Technology)
ETC-510: Course: Principles and Design of Wastewater Treatment & Disposal Systems

Time Allowed: 2 Hours *Maximum Marks: 30*

SECTION : A (Short Answer Type Questions/ to be answered in about max 250-300 words).
Attempt any TEN questions.

(Marks: 1 x 10 = 10)

1. Define pollutant, phase transfer and contaminants
2. Explain primary treatment and tertiary treatment
3. Explain why secondary settling tank is essentially provided in biological treatment
4. Explain Hazen's equation
5. Draw a flow chart of water supply scheme
6. Explain onsite and offsite/centralized treatment system
7. Explain wastewater treatment units configurations
8. What is the difference between unit operation and unit processes
9. Write various objectives of wastewater treatment
10. Explain the role of microorganisms in biological treatment
11. Why screens are kept inclined at 45-60 degree to the horizontal
12. Define wastewater and sewage. Explain waste water treatment plants (WWTP), sewage treatment plants (STP) and common effluent treatment plants (CETP)

SECTION: B (Medium Answer Type Questions to be answered in about 500 words).
Attempt any FOUR questions.

(Marks: 2.5 x 4=10)

1. Explain different types of solids present in a wastewater sample? How settable solids are measured in a given sample of wastewater?
2. Give the name of methods used to remove nutrients from wastewater? Also, explain eutrophication process.

3. What are the sources of colour and odour in wastewater? Describe various types of sedimentation tanks and sedimentation processes.
4. Explain attached growth and suspended growth processes with atleast three examples. A wastewater sample is contaminated with wood, oil & grease, grit and organic matter, give schematic diagram of treatment scheme.
5. What are Screens? Explain the working and design of bar screen used in waste water treatment plants? Give the formula to calculate head loss through screens?

SECTION: C (Medium Answer Type Questions to be answered in about 1000 words).

(Marks: 5 x 2 =10)

1. What is the basic principal behind Sedimentation? Give the mathematical statement of the Strokes' Law. Also explain the factors which affect the setting velocity of a particle in fluids? During two week a total of 610 gal of screenings was removed from wastewater screens. What is the average removal in cubic feet per day?
2. Explain secondary or biological treatment? What is the difference between Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD)? Explain the methods to calculate BOD and COD of a given sample of water? 50 mL of the waste sample was added directly into a 200 mL BOD bottle. The initial DO of the dilution sample was 8.8 mg/L and the final DO after 5 day was 3.9 mg/L. The corresponding initial and final DO of the seeded dilution water was 8.7 and 6.2 mg/L respectively. What is the 5 day BOD (BOD_5) of the wastewater sample?