

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 2455**

Roll No.

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**B.Tech.**

**(SEMESTER-VI) THEORY EXAMINATION, 2012-13**

**ENVIRONMENTAL ENGINEERING-II**

*Time : 3 Hours ]*

*[ Total Marks : 100*

**SECTION – A**

1. Attempt **all** question parts :

**10 × 2 = 20**

- (a) Describe the characteristics of waste water in brief.
- (b) Define BOD and COD.
- (c) What is the purpose of sedimentation tank ? Where are they located ?
- (d) Why are continuous types of settling tanks in common use at present ?
- (e) What are the effects which occur on water during filtration ?
- (f) Define effective size of sand and uniformity coefficient of sand.
- (g) Write short notes on Trickling filter.
- (h) Define Sludge digester.
- (i) Differentiate between aerobic and anaerobic treatment of sewage, giving major end products.
- (j) What do you understand by digestion of sewage sludge ?

**SECTION – B**

2. Attempt any **three** question parts :

**3 × 10 = 30**

- (a) (i) State and describe four important tests that may be carried out to know the characteristics of sanitary sewage.  
(ii) Explain Population equivalent.
- (b) Explain the theory of Sedimentation.
- (c) Draw a neat sketch showing the general layout of a rapid sand filter and explain its working.



- (d) (i) Describe in detail primary waste water treatment plant.
- (ii) Describe in detail primary sedimentation tank.
- (e) Design a septic tank for 200 users. Water allowance is 120 litres per head per day. Detention period may be taken as 8 hours. Draw a neat dimensioned sketch of the Septic tank you design.

### SECTION – C

Attempt **all** questions : 5 × 10 = 50

3. Attempt any **two** parts : 2 × 5 = 10

- (a) The BOD<sub>5</sub> of waste water is 150 mg/l at 20 °C, the k value is known to be 0.23 per day. What would BOD<sub>8</sub> be, if the test was run at 15° ?
- (b) Explain the importance of the following operations in a laboratory determination of BOD of waste water sample :
  - (i) pH adjustment
  - (ii) Dilution with aerated water
  - (iii) Seeding and nutrient addition to dilution water; and
  - (iv) Incubation at controlled temperature
- (c) Explain the importance of determination of solids in sewage. How do you determine the suspended solids in a given sample of waste water ?

4. Attempt any **one** part : 10

- (a) A settling tank is designed to remove spherical particles of 0.80 mm, diameter, with specific gravity 1.20 from the water at 22 °C. Determine the removal of spherical discrete particles of 0.40 mm diameter with specific gravity 1.20 by this tank. Assume ideal settling conditions.
- (b) Explain in detail about design aspects of continuous flow type of sedimentation tanks.

5. Attempt any **one** part : 10

- (a) Explain the under drainage system of a rapid sand filter and mention the general rules of design for such a system.
- (b) Explain the terms, loss of head and negative head, in connection with a rapid sand filter.

6. Attempt any **one** part :

10

- (a) Explain rapid sludge removal.
- (b) Explain the process of drying in sludge drying beds and mention the uses of dried sludge.

7. Attempt any **one** part :

10

- (a) Design an oxidation pond for treatment domestic sewage of 10000 persons supplied with 200 litres per capita water per day. The BOD and the suspended solids are each of 300 mg/l.
- (b) Design a septic tank for the following data :

No. of people = 100

Sewage/capita/day = 120 litres

De-sludging period = 1 year

Length: width = 4 : 1