

Roll No. ....

Total No. of Questions : 09]

12/12/09 (E)  
[Total No. of Pages : 02

B.Tech. (Sem. - 7<sup>th</sup>/8<sup>th</sup>)

ENVIRONMENTAL ENGINEERING - II

SUBJECT CODE : CE - 406

Paper ID : [A0626]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

**Section - A**

Q1)

(10 × 2 = 20)

- a) Differentiate between separate sewer and combined sewer.
- b) What is meant by Dry Weather Flow (DWF)? How is it important in sewer design?
- c) Explain the concept of '**hydraulically equivalent section**' in sewer design.
- d) What is '**time of concentration**'? How does it affect the design of storm sewers?
- e) Differentiate between '**lamp holes and man holes**'.
- f) Give any two unit operations and unit processes from wastewater treatment.
- g) What are anti-syphonage pipes? Why are they used?
- h) Find out the percentage reduction in the volume of the sludge, if moisture content of the sludge is reduced from 95% to 90%.
- i) What is meant by relative stability.
- j) Why is it required to properly dispose of effluent from a septic tank? List the methods.

**Section - B**

(4 × 5 = 20)

Q2) How do you test straightness of sewers laid? Describe the methods as per IS codes.

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- Q3) A city has 50 hectares of residential area. Its length is 2.5 km. A circular combined sewer is to be laid in the entire length. Assume velocity of flow 1 m/s, time of entry 10 min, population density 250 persons/hectare and water supply 180 lpcd. Design a **combined sewer** for 30 min duration rainfall under sewer running full condition.
- Q4) "Though there is no direct correlation exists between the BOD and COD, in specific plants the ratio between the two could be useful". Elucidate.
- Q5) A channel-type **grit chamber** has a flow through velocity of 0.25 m/s, a depth of 0.8 m and a length of 10 m. For inorganic grit particles with specific gravity 2.5, determine the particle size that can be removed with 100 percent efficiency. (assume  $v = 1.01 \times 10^{-2} \text{ cm}^2/\text{s}$ ).
- Q6) Differentiate between oxidation pond and oxidation ditch.

### Section - C

(2 × 10 = 20)

- Q7) Compare the advantages and disadvantages of different methods of sewage disposal on the basis of underlying objectives. Which methods will you choose for typical Indian city with lots of sunshine and air?
- Q8) (a) Calculate the surface area required for a stabilization pond to serve a population of 1 lakh sewage flow of 189 lpcd. BOD is 200 mg/L hydraulic loading of 250 kgBOD/d.ha. if the average liquid depth 1.5 m. Calculate the retention time of the sewage based on influent flow. Sketch the process diagram.
- (b) A trickling filter has a diameter of 20 m and depth 2.5 m. It is operated with a direct circulation ratio of 1.5 and influent sewage rate of 2 million litres per day. Influent BOD into the filter is 200 mg/L and effluent BOD is 30 mg/L. Calculate the hydraulic loading rate and organic loading rate. What is the efficiency of the filter?
- Q9) Write short notes differentiating the following :
- One Pipe system and single stack system of plumbing.
  - Grease trap and skimming tank.
  - Septic Tank and Imhoff tank
  - LRTF and HRTF.

