Code No: RR310104 **Set No. 1**

III B.Tech I Semester Supplimentary Examinations, November 2007
ENVIRONMENTAL ENGINEERING-I
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State the effects when each of the following substances exceeds prescribed limits of drinking water standards. [10]
   i. Nitrates
   ii. Sulphates
   iii. Chlorides
   iv. Fluorides and
   v. Iron and Manganese
   (b) Write a brief note on the incremental increase method of estimating Population. [6]

2. (a) A distribution main is tapped at a point where R.L. is 30m and where pressure is 12m head. The service pipe is 60m long and supplies water to 12 occupants at an average rate of 135 LPCD. The hourly variation factor is given as 4. Calculate the size of the supply main if residual head at the top outlet having R.L of 33m is not to fall 1.5m. use the formula V= 835 $m^{2/3}s^{1/2}$
   (b) How is the capacity of a distribution reservoir determined? [8+8]

3. (a) Distinguish between aerobic, anaerobic and facultative micro organisms present in the sewage. [6]
   (b) Define D.O, C.O.D and B.O.D. [6]
   (c) What is the principle involved in the treatment of sewage. [4]

4. (a) What is a storm water drain? What are the requirements of a storm water drain? [8+8]
   (b) Explain the different types of drains that are commonly used with neat figures.

5. (a) Explain the principles of sedimentation process. [8+8]
   (b) Design a set of sedimentation tanks to treat 100 million litres of water per day for the following data:
   Diameter of the tanks = 35 m
   Detention time = 2.5 hrs
   Weir loading rate = 300 m^3/day 1 metre length

6. (a) Differenciate between chlorination and chloramination. [8+8]
   (b) Explain chlorine- ammonia treatment for disinfecting drinking water.

7. Design a standard rate trickling filter plant and check for hydraulic loading rate

[16]

Population	= 1,00,000
Amount of water of water supply	= 150 lpcd
Amount of sewage	= 80 % of water supply
Peak discharge	= 1.5 times average discharge
BOD of raw sewage	= 400mg/l
Amount of BOD removal in Primary Treatment	= 30 %
BOD loading rate	= 0.25 kg/m^3/day
Number of units	= 2
Depth of filter	= 2m.

8. (a) Write short note on the factors affecting sludge digestion. [8+8]
   (b) With the help of a neat sketch s describe the sludge digestion tank.

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Code No: RR310104 **Set No. 2**

III B.Tech I Semester Supplimentary Examinations, November 2007
ENVIRONMENTAL ENGINEERING-I
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State the effects when each of the following substances exceeds prescribed limits of drinking water standards. [10]
   i. Nitrates
   ii. Sulphates
   iii. Chlorides
   iv. Fluorides and
   v. Iron and Manganese
   (b) Write a brief note on the incremental increase method of estimating Population. [6]
2. (a) What are the different methods of analyzing a given distribution system? Explain any one in detail. [8+8]
   (b) Explain
   i. sluice valve
   ii. air valve
3. (a) How is the capacity of a sewer calculated for its design. What is the design period adopted for different components of a Sewerage Scheme [8+8]
   (b) What are the causes of variation in the flow of sewage. What are their effects on the design of sewers?
4. (a) Write a note on flushing of sewers. [8+8]
   (b) Sketch and describe the working of an automatic flushing tank for a town sewer.
5. (a) Explain the main objectives of treatment of water used for domestic purposes.
   (b) What is meant by clari-flocculation? [8+8]
6. (a) Explain with the help of sketches the construction of rapid sand gravity filters.
   (b) Draw a neat sketch of rapid sand filter to explain its working along with back washing process. [8+8]
7. (a) Explain with neat sketch horizontal flow rectangular sedimentation tank. [8+8]
   (b) Explain briefly different methods of sludge removal from sedimentation tanks.

8. Design an oxidation pond for the population of 12000 and sewage flow rate of 140l/h/d. BOD of sewage is 300 mg/l and effluent BOD required is not greater than 50 mg/l. Temperature is 24^0 C. K_{20} is $0.25d^{-1}$ [16]

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Code No: RR310104 **Set No. 3**

III B.Tech I Semester Supplimentary Examinations, November 2007
ENVIRONMENTAL ENGINEERING-I
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the water-borne diseases? How can they be prevented. [8+8]
   (b) Sketch and design an intake suitable for drawing water from a river where the water level is kept almost constant by means of a cross weir across the river.

2. (a) A distribution main is tapped at a point where R.L. is 30m and where pressure is 12m head. The service pipe is 60m long and supplies water to 12 occupants at an average rate of 135 LPCD. The hourly variation factor is given as 4. Calculate the size of the supply main if residual head at the top outlet having R.L of 33m is not to fall 1.5m. use the formula V= 835 $m^{2/3}s^{1/2}$
   (b) How is the capacity of a distribution reservoir determined? [8+8]

3. Why is the knowledge of storm sewage necessary? How is storm sewage Computed? Describe the factors affecting the quantity of storm sewage. [16]

4. (a) What is a trap. When and where should it be provided. What are the requirements of a good trap. [8+8]
   (b) Describe Intercepting Trap, Floor trap and Gulley trap. .

5. (a) Explain briefly the sedimentation process in a water treatment plant with the help of a neat sketch. [10]
   (b) What are the common types of sedimentation tanks? [6]

6. (a) Explain with neat sketch the details of perforated pipe under drains.
   (b) A filter unit of size 4mx8m. After filtering 8500 m^3 in 24 hour period, the filter is back- washed at the rate of 10 l/m^2/sec for 10 minutes. Compute the average filtration rate, quantity and percentage of treated water used in washing and the ate of wash water flow in each trough.
   The unit has 4 troughs. [8+8]

7. Design an aerated grit chamber for the treatment of municipal waste water. The average flow rate is 0.5cu.m/sec. Peaking factor 2.75. [16]

Average detention time	= 3 minutes
Width	= 3m
Depth-width ratio	= 1.2
Air supply requirement	= 0.04 cu.m/minute per metre length.
Quantity grit	= 50 x 10^{-3} cu.m/10^3 cu.m.

8. (a) What is an oxidation pond? State its advantages and disadvantages. [8+8]

(b) State the features for the design of oxidation ponds.

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Code No: RR310104 **Set No. 4**

III B.Tech I Semester Supplimentary Examinations, November 2007
ENVIRONMENTAL ENGINEERING-I
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain briefly the main objectives of analysis of water used for domestic purposes. [8+8]

   (b) The following are the results of the Physical and Chemical analysis of a sample of surface water considered as the only available source of supply. Calculate the hardness and alkalinity of water and mention the proposed treatment for this type of water.

Chemical Constituent	Concentration mg/lit	Chemical Constituent	Concentration mg/lit
Ca	30	Fe	0.4
Mg	40	Mn	0.3
Na	30	Turbidity	600
K	10	pH	8.5
CO_3	30	F	4.0
HCO_3	70	NO_3	0.1
SO_4	80	-	-

2. Write short notes on the following . [4 x 4=16]

   (a) Spigot and Socket Joint

   (b) Water meter

   (c) Fire- Hydrant

   (d) Air valve

3. (a) How is the capacity of a sewer calculated for its design. What is the design period adopted for different components of a Sewerage Scheme [8+8]

   (b) What are the causes of variation in the flow of sewage. What are their effects on the design of sewers?

4. (a) Explain the importance of reoxygenation and deoxygenation in problems of stream sanitation. [8+8]

   (b) Explain Self-purification of Streams and indicate the factors affecting the same.

5. (a) Explain the main objectives of treatment of water used for domestic purposes.

   (b) What is meant by clari-flocculation? [8+8]

6. (a) Explain any two methods of disinfection with their merits and demerits. [8+8]

(b) Describe a suitable method for applying chlorine to a rural water supply system.

7. (a) What are the operational problems and their remedies in trickling filters. [8+8]
   (b) What are the different methods of disposal of screenings?

8. (a) Explain the components of a septic tank with a neat sketch. [8+8]
   (b) What are the design criteria for design of septic tank?

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