Code No: R05320102 **Set No. 1**

III B.Tech Supplimentary Examinations, Aug/Sep 2008
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) If 500 litre of a water sample of pH 4.5 and Fluoride concentration 0.5 ppm is mixed with 1.5 cu.m of water of pH 9.2 and Fluoride 1.2 ppm, find the pH and Fluoride in the mixture.
   (b) Give the Desirable and Maximum permissible standards as per IS 10500 for any 16 parameters in Drinking water. [16]

2. Discuss the suitability of various surface and ground water sources for use in Municipal and Industrial water supplies with reference to their Quality and Quantity. [16]

3. Write a detailed note on any FOUR of the following:
   (a) Coagulation with Iron salts Vs. Coagulation with Lime
   (b) Factors affecting the Efficiency of Coagulation
   (c) Natural coagulants and Coagulant aids.
   (d) Stages of treatment in Chemical Precipitation
   (e) Significance of Settling Velocity in Sedimentation
   (f) Significance of Jar Test in water treatment. [16]

4. (a) Find the area of Rapid Sand Gravity Filter required for a Town of Population 200,000 with a demand of 140 lpcd if the filter
   (i) operates for 12 hours a day
   (ii) is cleaned only once everyday and
   (iii) is cleaned once in 48 hours. Assume that it takes totally 45 minutes for cleaning of filter.
   Also find the approximate quantity of sand required for the filter and the water required cleaning the filter.
   (b) Distinguish between Slow Sand Gravity and Rapid Sand Gravity Filters with reference to Rate of Filtration, Quantity of sand and Size of filter, Main treatment process responsible, Pretreatment required, Quantity of water required for cleaning, Operation problems involved, Maintenance required, Period of cleaning and method of cleaning, Loss of head, Efficiency of removal of bacteria, efficiency of removal of turbidity, and Suitability in water supply schemes. [16]

5. (a) What do you understand by an equivalent pipe? How do you determine its length when the pipes are
   (a) in series
   (b) in parallel.
   (b) The observed cumulative drafts for a town are stated below; the drafts are at four hour interval.

Time	4 A.M	8 A.M	Noon	4 P.M	8 P.M	mid Night
Cumulative draft in million litres	0.5	1.40	2.60	3.70	4.50	5.00

   Determine the equalizing storage for the above drafts; when the pumping is
   (a) 24 hours and
   (b) between 6 A.M and 6 P.M. [6+10]

6. Define and explain the following terms, connected to sewer designs:
   (a) self cleansing velocity
   (b) Non-scouring velocity
   (c) Hydraulically equivalent section; and
   (d) Circular and Egg-shaped sewer sections. [4+4+4+4]

7. (a) Why coagulants are used in the sewage treatment? List various coagulants used along with their effectiveness in sedimentation of sewage.
   (b) Discuss in brief various design parameters used for settling tanks. [8+8]

8. (a) Explain the function of a soak pit with a neat sketch.
   (b) Design a septic tank for 70 users of a hostel. Assume the necessary data. (the daily water supply rate is 140 l/p/day). [8+8]

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Code No: R05320102 **Set No. 2**

III B.Tech Supplimentary Examinations, Aug/Sep 2008
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. Explain the sources, effects on human health and wellbeing and Methods of control of the following parameters w.r.t. IS 10500.

   (a) Fluoride
   (b) Iron
   (c) Mercury
   (d) Hardness
   (e) Nitrate
   (f) M.P.N.
   (g) Color
   (h) pH
   (i) Lead
   (j) Alkalinity
   (k) Odor
   (l) Turbidity
   (m) Sulphate
   (n) Cyclopes
   (o) Iodine
   (p) Arsenic [16]

2. Discuss the suitability of various surface and ground water sources for use in Municipal and Industrial water supplies with reference to their Quality and Quantity. [16]

3. Write a detailed note on any FOUR of the following:

   (a) Coagulation with Iron salts Vs. Coagulation with Lime
   (b) Factors affecting the Efficiency of Coagulation
   (c) Natural coagulants and Coagulant aids.
   (d) Stages of treatment in Chemical Precipitation
   (e) Significance of Settling Velocity in Sedimentation

(f) Significance of Jar Test in water treatment. [16]

4. (a) Describe the working of a Pressure Filter with the help of a sketch.

   (b) A private estate uses a Pressure filter to treat 500 cu.m./day of turbid water. If filter operates from 04.00 pm to 08.00 am every day, find the size of pressure filter. Also find the approximate HP of the pump that supplies water to pressure filter under pressure. [16]

5. (a) On what factors do the available pressures in a distribution system depend?

   (b) What terminal pressure heads would you recommend in case of the following.
   (i) A large city with a population of 5 lakhs
   (ii) A large city with a population of 1 lakh.
   (iii) A small town with a population of 50000. [8+8]

6. Write short notes on:

   (a) Estimating the design sewage discharge;

   (b) Design periods for different components of a sewerage scheme;

   (c) Per-capita sewage; and

   (d) Time variations in sewage flow, and their effects on design of sewer capacities. [4+4+4+4]

7. (a) State merits and demerits of trickling filter.

   (b) Clearly bring out the comparison between activated sludge process and trickling process. [8+8]

8. (a) Why dewatering of sludge is necessary? Explain the method of dewatering the sludge on sludge drying beds.

   (b) Explain vacuum filtration method of dewatering sludge. [8+8]

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Code No: R05320102 **Set No. 3**

III B.Tech Supplimentary Examinations, Aug/Sep 2008
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. Write short notes on:
   (a) Water Quality Testing
   (b) Industrial Water Demand
   (c) Fluctuations in water demand
   (d) Design Period. [16]
2. Write a detailed note, with the help of a sketch, on:
   (a) Water Scarcities and possible solutions.
   (b) River Intake. [16]
3. Write a detailed note on any FOUR of the following:
   (a) Significance of Settling Velocity in Sedimentation
   (b) Significance of Jar Test in water treatment
   (c) Natural coagulants and Coagulant aids.
   (d) Stages of treatment in Chemical Precipitation
   (e) Clariflocculator
   (f) Feeding arrangements in Coagulation-Flocculation Systems. [16]
4. (a) Find the area of Rapid Sand Gravity Filter required for a Town of Population 200,000 with a demand of 140 lpcd if the filter
   (i) operates for 12 hours a day
   (ii) is cleaned only once everyday and
   (iii) is cleaned once in 48 hours. Assume that it takes totally 45 minutes for cleaning of filter.
   Also find the approximate quantity of sand required for the filter and the water required cleaning the filter.
   (b) Distinguish between Slow Sand Gravity and Rapid Sand Gravity Filters with reference to Rate of Filtration, Quantity of sand and Size of filter, Main treatment process responsible, Pretreatment required, Quantity of water required for cleaning, Operation problems involved, Maintenance required, Period of cleaning and method of cleaning, Loss of head, Efficiency of removal of bacteria, efficiency of removal of turbidity, and Suitability in water supply schemes. [16]

5. (a) Describe the laying and testing of water pipes.
   (b) How do you assess the storage capacity of a service reservoir? [8+8]

6. (a) What is meant by "Environmental Pollution"? Describe what happens when untreated sewage from a town is discharged into a nearby stream.
   (b) Sewage disposal systems are to be provided for:
      i. an isolated residential building with ten users
      ii. a small town of 2000 persons located on the bank of a river
      iii. a town with 10,000 persons located on the bank of a small river.
      Describe the possible methods of sewage disposal for each case and bring out the advantages and disadvantages of the various methods listed. [8+8]

7. (a) Determine the size of a high rate trickling filter for the following data
      i. Sewage flow = 4 mLd
      ii. Recirculation ratio = 1.4
      iii. BOD of raw sewage = 260 mg/l
      iv. BOD removal in primary clarifier = 30%
      v. Final effluent desired = 40 mg/l
   (b) Write a short notes on racks and screens. [8+8]

8. Write notes on the following:
   (a) Clarigester
   (b) Bio filter
   (c) Up flow filter
   (d) Dispersion trench. [4+4+4+4]

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Code No: R05320102 **Set No. 4**

III B.Tech Supplimentary Examinations, Aug/Sep 2008
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) The populations of a town in 1950, 1960, 1970 and 1980 are 58000, 75000, 90,000 and 135000 respectively. Find the population in 2020 using Arithmetic, Geometric and Incremental increase methods.
   (b) Discuss the various factors affecting the Design Water Demand of a City. [16]

2. Discuss the suitability of various surface and ground water sources for use in Municipal and Industrial water supplies with reference to their Quality and Quantity. [16]

3. Discuss in detail, with the help of sketches, the role of following design considerations while designing a Settling/Sedimentation system like a clarifier.
   (a) Surface loading
   (b) Detention Time
   (c) Shape of the Reactor
   (d) Depth
   (e) Types of Sedimentation. [16]

4. Describe the construction details, and functions of various components of a 'Slow Sand Filter' with the help of a sketch. Explain in detail how it works and the Operation and maintenance problems associated with it. Also explain its design principles. [16]

5. (a) State the functions of a service reservoir and sketch the sectional elevation of the same, showing the various appurtenances.
   (b) Discuss with the help of diagrams, various methods of laying out the distribution system. [6+10]

6. (a) Write short note on BOD.
   (b) Calculate 1 day 37^0 C BOD of sewage sample whose 5-days 20^0C. BOD is 100 mg/l. [8+8]

7. (a) Draw a neat sketch to represent a flow diagram of a typical sewage treatment plant and explain the functions of each component.

(b) How sedimentation of sewage is done? Explain in brief the theory of sedimentation. Explain the applications of Stokes law for sewage sedimentation. [8+8]

8. (a) Design a septic tank for 100 users in a hostel. Assume per capita water demand as 150 litres.

(b) Write a note on soak pit. [8+8]

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