Code No: R32012

R10

Set No: 1

III B.Tech. II Semester Regular Examinations, April/May -2013
WATER AND WASTEWATER ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) How does the fire demand affect the design of distribution system? Calculate the fire demand for pollution of 40000.
   b) The population of city as per the previous census years was 3,00,000, 4,48,400, 6,67,000, and 9,89,000. Find out the anticipated population at the next census to the nearest 5,000.

2. a) Enumerate various sources of surface water. Compare the quality and quantity aspects of ground and surface water sources.
   b) What are the major precautions that need to be taken in handling and laying water pipe lines? What provisions are made in the design of pipe lines? Explain with neat sketch.

3. a) Describe by means of a neat sketch circular sedimentation tank. Also state on what factors the choice of feeding device is made.
   b) The water works section has to purify the water for a town whose daily demand is 8.75×10^6 l/day. Design a suitable Sedimentation tank fitted with Mechanical Sludge Remover. Assume detention time as 7hr. and velocity of flow in the Sedimentation tank as 25cm/min.

4. a) By means of neat sketch explain the principle and working of Pressure filters. Also state the advantages and disadvantages of the same.
   b) What are the various methods of disinfecting water? State the theory of disinfection of water by Chlorine. Also state the factors that affect the efficiency of the disinfection process.

5. a) Explain in detail the term 'Time of Concentration' and state its significance in the storm drainage. Also enumerate various shapes and materials used for design of sewers.
   b) In a BOD test using 7% dilution of the sample (21ml of sample and 279ml of diluted water). D.O values for the sample and the dilution water bottles after 5 days incubation at 20°C were 2.75 and 7.65 mg/l respectively. D.O originally present in the undiluted sample was 0.76mg/l. Find out the 5 day 20°C BOD of the sample.

6. a) Define Sewage Farming and Oxygen Sag Curve and mention in detail their significance in stream pollution.
   b) Explain in detail by means of neat sketches the working of any three types of sewer appurtenances.

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7. a) What do you understand by Biological treatment? Calculate the volume of a single stage trickling filter required to yield an effluent of BOD_5 of 15mg/l when treating settled domestic sewage with BOD_5 of 110mg/l. The sewage flow is $2000 m^3$/day and the recirculation is constant at $4300 \ m^3$/day.

b) Explain the principle involved in the sewage treatment of Activated Sludge Process.

8. a) Design an Oxidation Pond for the following data:

Population   15000, Sewage flow   130 lpcd, Influent BOD   325 mg/lt,
Effluent BOD 35 mg/lt, Organic loading rate   300 kg/hect/day,
Pond Removal constant k_o =0.1/d, L:B 4:1

b) Write a short note on Sludge digestion and the factors affecting the same.

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Set No: 2

III B.Tech. II Semester Regular Examinations, April/May -2013
WATER AND WASTEWATER ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Give the permissible limits for drinking water as per IS: 10500 for the following parameters and also state the process of measurement. Total Hardness, Colour, Odour, Fluorides and Alkalinity.
   b) The population of a locality as obtained from the census report is as follows:

Year	1930	1940	1960	1960	1970	1980	1990	2000
Population	21610	28560	37640	45520	53450	60740	72380	80500

   Estimate the population of the locality in the year 2030, 2040 by Arithmetical Increase Method and Geometrical Increase Method.

2. a) Explain Hardy Cross method used for pipe network analysis in water distribution system.
   b) What are the requirements of a good meter and also state the various advantages and disadvantages of metering.

3. a) What is the necessity of using coagulants in sedimentation? Enumerate the various chemical coagulants which are commonly used in Coagulation process along with the chemical reactions.
   b) The treatment plant has a Sedimentation tank of size 60 x 17.5 x 4.0 m. If 80ppm suspended solids are present in water and 83% are removed in the basin, and the average specific gravity is 2.2, determine the detention time, Overflow rate, average flow of water through the tank deposition of solids in the tank, if 5.5×10^6 lts of water is treated daily.

4. a) Why chlorine is widely used as a disinfectant in municipal water treatment?. What is the process involved in Post Chlorination and Super chlorination?
   b) Explain in detail the theory of filtration. Classify the various types of filters used for the process.

5. a) What is BOD? Deduce the expression for BOD with time. State the factors on which the deoxygenation constant (k) depend.
   b) List out the various characteristics of Sewage. Calculate from Manning's equation the diameter of a circular vitrified Clay Sewer (n = 0.013) which will just carry 1.55 cumec when flowing full and also when the flow is 0.6 times depth at a slope of 1:1000.

6. a) What is Sewage farming? List out the advantages over the method of disposal of sewage by dilution. What precautions must be taken in its operation?
   b) Name the various types of Sanitary Fittings. Describe any two in detail.

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Set No: 2

7. a) Give the layout of various units in wastewater treatment plant by stating the importance of each.
    b) Enumerate the comparative differences between Standard and high rate Trickling Filters.

8. a) Design a septic tank for the following data: number of people = 125, sewage per capita per day = 115 lts, desludging period = 1 year, L : B = 4:1, Detention time = 32 hr, sludge accumulation rate = 27.5 lt/person/year, Depth of the tank = 1.35 m. What would be the volume of the soak well if the effluents are to be discharged in it? Assume percolation capacity as 1100 lt/m^3/day.
    b) Give the step by step procedure for the design of soak pits along with neat sketch.

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R10

Set No: 3

III B.Tech. II Semester Regular Examinations, April/May -2013
WATER AND WASTEWATER ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) Name the different methods of forecast of Population along with the required equations. Define the term Fire demand.
    b) Explain in detail the various tests that are to be conducted to decide the portability of water as per IS : 10500.

2. a) What are intake structures? What points should be kept in mind while selecting the site for intake works?
    b) What are the requirements for designing a distributory system? State the precautions to be taken to make the design economical.

3. a) What are the main objectives involved in treating water? Explain the process of treatment of water in the Plain Sedimentation.
    b) Explain the importance and design principles of Clarifloculators used in the treatment process of water.

4. a) State different methods of disinfection of water. Describe different methods of application of Chlorine at different stages.
    b) Explain in detail the working and principle involved in rapid gravity filter along with the neat sketch.

5. a) What are the various characteristics of sewage? Explain each in detail.
    b) A 650 mm diameter sewer is required to flow at half the depth on a grade ensuring a degree of self cleansing equivalent to that obtained at full depth at a velocity of 0.9 m/s. Find the required grade, associated velocities and discharge at full depth and half depth. Take a uniform value of 'n' as 0.015.

6. a) State the significance of Self-Purification of streams and the factors affecting the same.
    b) Explain the necessity of providing the manhole in sewer line. Explain its construction with the help of a neat sketch.

7. a) Explain the basic difference between primary treatment and secondary treatment of sewage. Also state the purpose of Screening in treatment process.
    b) What are the factors that are held responsible for reduction in the efficiency of the Sedimentation tanks? With the help of a neat sketch, describe a Sedimentation tank.
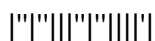
R10

Set No: 3

8. a) Draw a neat sketch of Septic tank and explain its working.
    b) Design a sludge digestion tank with the following data:

Average flow of Sewage	20×10^6 l/day
Total Suspended solids in Raw Sewage	350 mg/lt
Volatile Suspended Solids	250 mg/lt
Water Content of Raw Sludge	96%
Water Content of Digested	90%
Volatile Solids reduction	50%

Assume any other required data.

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Set No: 4

III B.Tech. II Semester Regular Examinations, April/May -2013
WATER AND WASTEWATER ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Define the term: Per Capita Demand and mention in detail the various factors which directly affect the water demand of a town.
   b) The population of a locality as obtained from the census report is as follows:

Year	1941	1951	1961	1971	1981	1991	2001	2011
Population	7000	11000	16000	21500	28000	36500	46000	56000

   Estimate the population of the locality in the year 2021 by Incremental Increase Method and Arithmetic Increase Method.

2. a) State the various types of pipes used for conveying water in water supply scheme. Discuss the merits and demerits of each.
   b) Explain in detail Equivalent pipe method used for pipe network analysis in water distribution system.

3. a) What are the various processes required to remove different types of impurities in water? Also list the points to be remembered at the time of layout of the treatment plant.
   b) How does the application of coagulation help in treatment of water? Discuss the design characteristics of Coagulation tank.

4. a) What are the various miscellaneous methods available for treatment of water? Explain any one in detail.
   b) Design a set of rapid gravity filters for treating water required for a population of 50000, the rate of supply being 180 lt/head/day. The filters are rated to work at 5200 lt/sq.m./day.

5. a) Discuss the comparative merits and demerits of the separate system and combined system of sewerage. Also list out the methods to design the storm drainage.
   b) Determine the Ultimate BOD of a wastewater sample which was subjected to the BOD determination as follows: 8ml of wastewater containing no dissolved oxygen was mixed with 392 ml of water containing 8.0 mg/lt of DO. After incubation at 20°C for 5 days, the DO of the mixture was 4.5mg/lt. The BOD constant 'k' to the base 'e' is 0.25/day.

6. a) What are various methods of sewage disposal? What is meant by Dilution and under what circumstances it is most suitable.
   b) What are the requirements of Sanitary Fittings? Write a short note on one pipe and two pipe system of plumbing.

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Code No: R32012

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Set No: 4

7. a) Design a rectangular grit chamber from the following data:

Flow of Sewage	65×10^6 lt/day
Specific gravity of the grit	2.70
Size of the grit particles to be removed	0.25mm
Viscosity of water	1.0×10^{-2} cm^2/sec.

b) Explain the process of biological treatment. Sketch and explain the working principle of Standard rate trickling filter.

8. a) Describe the construction and working of an Anaerobic Pond with the help of a neat sketch.

b) Explain the process involved in the sludge disposal by drying. Design a sludge drying bed for digested sludge from an activated sludge plant serving 1,00,000 people.

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