Code No: **R1641011** **R16** **Set No. 1**

**IV B.Tech I Semester Regular Examinations, October/November - 2019**

**ENVIRONMENTAL ENGINEERING - II**

**(Civil Engineering)**

**Time: 3 hours** **Max. Marks: 70**

***Question paper consists of Part-A and Part-B***
***Answer ALL sub questions from Part-A***
***Answer any FOUR questions from Part-B***
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**PART–A** ***(14 Marks)***

1. a) What are the factors which mainly affect the quantity of storm sewage? [3]
   b) Explain the classification of traps. [3]
   c) Distinguish between BOD and COD. [2]
   d) What are the objectives of Oxidation Pond? [2]
   e) What do you mean by Nitrification? [2]
   f) Define sewage sickness. [2]

**PART–B** ***(4x14 = 56 Marks)***

2. a) What do you mean by variation in flow of sewage? Discuss average flow, dry weather flow, and maximum flow. [7]
   b) A 30 cm dia. sewer having an invert slope of 1 in 150 was flowing full. What would be the velocity of flow and discharge? (n=0.013). Is the velocity self cleansing? What would be the velocity and the discharge when the same is flowing 0.20 and 0.8 of the full depth? [7]

3. a) Briefly discuss with neat sketch the functions and uses of a sewage pumping station. [8]
   b) Explain Systems of plumbing. [6]

4. a) State and describe four important tests that may be carried out to know the characteristics of sanitary sewage. [6]
   b) The average sewage flow from a city is 80 x 106 l/d. If the average 5-days BOD is 285 mg/l, compute the total daily 5-day oxygen demand in kg, and the population equivalent of sewage k=0.1. Assume per capita BOD of the sewage per day = 75 gm. [8]

5. a) Differentiate suspended growth process and attached growth process. [7]
   b) Discuss the process involved in a trickling filter. [7]

6. a) Explain a method for removal of Phosphates. [7]
   b) Design a septic take for a small colony of 100 persons with daily sewage flow of 135 litres per head per day. [7]

7. a) Write notes on self purification of streams. [7]
   b) Describe the ultimate disposal of waste water. [7]

Code No: **R1641011** **R16** **Set No. 2**

**IV B.Tech I Semester Regular Examinations, October/November - 2019**

**ENVIRONMENTAL ENGINEERING - II**

**(Civil Engineering)**

**Time: 3 hours** **Max. Marks: 70**

***Question paper consists of Part-A and Part-B***
***Answer ALL sub questions from Part-A***
***Answer any FOUR questions from Part-B***
*****

**PART–A** ***(14 Marks)***

1. a) Explain the time of concentration and its significance in design of storm sewers. [3]
   b) Write a Hazen William's formula for of water through pipe. [2]
   c) What is the purpose of Flotation? [2]
   d) What are the objectives of Activated sludge process? [3]
   e) What do you mean by Denitrification? [2]
   f) What are the different methods of sewage disposal? [2]

**PART–B** ***(4x14 = 56 Marks)***

2. a) Draw two suitable surface drain sections and explain their advantages and disadvantages. [6]
   b) A sanitary sewer is to serve a uniformly distributed population of 10,000 along a 1.000m road. The average ground slope for first 500 m is 1 in 400, and for the remaining as 1 in 900. Design the sewer. Give expected peak, average and minimum velocities. Make suitable assumptions, and state them clearly. [8]

3. a) Enumerate the different types of pumps used for sewage pumping. What are their advantages and disadvantages? [8]
   b) Explain two pipe system of plumbing. [6]

4. a) Explain the importance of determination of solids in sewage. How do you determine the suspended solids in a given sample of waste? [7]
   b) The 3 day $37^{o}$C BOD of a sample of sewage is 300 ppm. What will be its 10 days – $20^{o}$ C BOD and 5 day $30^{o}$ C BOD? [7]

5. a) Discuss the process involved in a trickling filter. [7]
   b) Explain the methods of aeration in detail. [7]

6. a) Describe the objectives of Imhoff tank in treatment process? [6]
   b) Design a septic take for a small colony of 150 persons with daily sewage flow of 135 litres per head per day. [8]

7. a) Explain the objectives of sludge drying? [7]
   b) Write notes on Sewage farming. [7]

Code No: **R1641011** **R16** **Set No. 3**

**IV B.Tech I Semester Regular Examinations, October/November - 2019**

**ENVIRONMENTAL ENGINEERING - II**

**(Civil Engineering)**

**Time: 3 hours** **Max. Marks: 70**

***Question paper consists of Part-A and Part-B***
***Answer ALL sub questions from Part-A***
***Answer any FOUR questions from Part-B***
*****

**PART–A** ***(14 Marks)***

1. a) Mention the various aspects you would keep in view while designing a sewer. [3]
   b) Under what circumstances manholes are provided in sewerage system. [3]
   c) State the principle of sedimentation. [2]
   d) What are the modifications of Activated sludge process? [2]
   e) What are the objectives of Nitrification? [2]
   f) What are the objectives of Sludge treatment? [2]

**PART–B** ***(4x14 = 56 Marks)***

2. a) Explain the methods of sewage collection. [6]
   b) A 30 cm dia sewer an invert slope of 1 in 400 is flowing 1/3$^{rd}$ of the full depth. Calculate the velocity and the rate of flow in the sewer. Is it self-cleaning velocity? Use n=0.015. [8]

3. a) Discuss the different components of a pumping station? [8]
   b) Describe the different systems of plumbing? Explain any one in detail. [6]

4. a) Enumerate various methods available for treatment of wastewater. [6]
   b) The effluent from a primary settling tank is applied to a standard rate filter at the rate of 4 million liters per day, having a BODs of 175 mg/l. Determine the depth and volume of filter, adopting a surface loading of 2000 l/m$^2$/day and an organic loading of 150 g/m$^3$/day. Also, determine the efficiency of such filter unit, using NRC formula. [8]

5. a) Describe standard and high rate trickling filters and comparison. [8]
   b) Explain Grit chamber with a neat sketch and design specification. [6]

6. a) Write notes on reuse and recycle of septic tank effluent. [6]
   b) Design a septic take for a small colony of 200 persons with daily sewage flow of 135 litres per head per day. [8]

7. a) Write detailed notes on treatment of sludge. [7]
   b) Explain the disposal of sewage into sea. [7]

Code No: **R1641011** **R16** **Set No. 4**

**IV B.Tech I Semester Regular Examinations, October/November - 2019**
**ENVIRONMENTAL ENGINEERING - II**
**(Civil Engineering)**

**Time: 3 hours** **Max. Marks: 70**

***Question paper consists of Part-A and Part-B***
***Answer ALL sub questions from Part-A***
***Answer any FOUR questions from Part-B***
*****

**PART–A** ***(14 Marks)***

1. a) How does the variation of sewage flow affect its velocity in a circular sewer? [3]
   b) Mention which type of pump is most suitable for sewage pumping. Give reasons. [3]
   c) What are the objectives of grit removal? [2]
   d) Distinguish between unit operations and unit processes. [2]
   e) What are the objectives of Denitrification? [2]
   f) Differentiate Aerobic digestion and anaerobic digestion. [2]

**PART–B** ***(4x14 = 56 Marks)***

2. a) What are the different hydraulic elements and the relation that exists between them, which govern the discharge through a sewer? [6]
   b) Design a sanitary sewer with the following data:
   (i) Population served = 25,000
   (ii) Expected sewage flow = 135 l/c/d (average)
   (iii) Average slope of the ground = 1 in 500 [8]

3. a) Describe the procedure for laying and testing of sewers. [6]
   b) What are the functions of a manhole. Describe with the help of neat sketches the Components of a manhole. [8]

4. a) Draw the layout and general outline of various units in waste water treatment plant with their functions. [8]
   b) Define “biological treatment of sewage”? Explain the principle of biological treatment? [6]

5. a) Distinguish between standard rate and high rate trickling filter. [7]
   b) Explain the primary treatment processes in waste water. [7]

6. a) Explain Denitrification process. [6]
   b) Design a septic take for a small colony of 250 persons with daily sewage flow of 135 litres per head per day. [8]

7. a) Explain sludge digestion? What are the factors affecting it? [7]
   b) Write short notes on Sludge disposal. [7]