

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017
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 THREE questions from Part-B*

PART-A (22 Marks)

1. a) What are the merits of Water Conservation System? [3]
- b) What are the different components of Pumping Unit? [4]
- c) What is the principle of Sedimentation in wastewater treatment? [4]
- d) What do you mean by secondary treatment? [3]
- e) What is nitrification process in the wastewater treatment? [4]
- f) What do you mean by self purification of streams? [4]

PART-B (3x16 = 48 Marks)

2. a) What are the advantages of the egg-shaped section, and under what conditions of flow, does it become more useful? Will you recommend its use for sanitary sewers, and if not, why? [8]
- b) Calculate from Manning's formula the diameter of a circular vitrified clay sewer ($n = 0.013$), which will just carry 0.05 cumecs, when flowing full at a slope of 1 in 1000. [8]
3. a) State the functions of a manhole. Describe with the help of neat sketches the components of a manhole. [8]
- b) Explain various systems of sanitary plumbing. Write down the main characteristics of each system. [8]
4. a) Write a detailed note on various design parameters, such as settling velocity, overflow rate and detention time. [8]
- b) The effluent from a primary settling tank is applied to a standard rate filter at the rate of 3 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/m²/day and an organic loading of 150 g/m³/day. Also, determine the efficiency of such filter unit, using NRC formula. [8]
5. a) Give the flow diagram for the "activated sludge process" and describe its working. [8]
- b) Design a single-stage trickling filter to yield an effluent BODs of 30 mg/l. The influent BODs following primary clarification is 160 mg/l and the flow is 10⁴ m³/day. Maintain a hydraulic loading rate of 20 m/day and a filter depth of 2 m. [8]
6. a) Explain the components of a septic tank with a neat sketch. [8]
- b) What are the design criteria for design of septic tank? [8]
7. a) What do you understand by thickening (or) concentration of sludge? List the various methods of sludge thickening. Describe with the help of neat sketch gravity-sludge thickener. [8]
- b) Write note on Sludge Conditioning. Why elutriation is necessary prior to Chemical Conditioning. [8]



Code No: RT41011

R13**Set No. 2****IV B.Tech I Semester Regular/supplementary Examinations, October/November - 2017
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PART-A (22 Marks)

1. a) What are the demerits of old conservancy system? [3]
- b) What are the disadvantages of one pipe system of plumbing? [4]
- c) What is the importance of BOD in wastewater treatment? [4]
- d) What is the principle of activated sludge process? [4]
- e) How the phosphates can be removed from the wastewater? [4]
- f) What are the disposal methods of sludge? [3]

PART-B (3x16 = 48 Marks)

2. a) What are the different hydraulic elements and the relation that exists between them, which govern the discharge through a sewer? [8]
- b) A 30 cm diameter sewer an invert slope of 1 in 400 is flowing $1/3^{\text{rd}}$ 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) What are the sewer appurtenances? Explain with neat sketch the working and construction of man hole. [8]
- b) Write a note on sanitary ventilation? [8]
4. a) Describe in brief various unit operations for chemical clarification along with the design recommendations. [8]
- b) Write a note on removal of suspended solids and BOD by plain sedimentation in primary settling tank. [8]
5. a) What do you understand by secondary treatment (or biological treatment) of wastewater? Enumerate various treatment techniques used for biological treatment. [8]
- b) Explain the construction and working of intermittent sand filters. What are its advantages and disadvantages? [8]
6. a) Write a note on anaerobic treatment of wastewater. [8]
- b) Draw a neat sketch of septic and explain its working. [8]
7. a) Explain the self purification process of rivers and the various stages of oxygen sag curve. [8]
- b) Discuss the need for sludge treatment and explain the various stages of sludge treatment. [8]

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R13**Set No. 3****IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017**
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 THREE questions from Part-B*

PART-A (22 Marks)

1. a) What are the advantages of separate system? [3]
- b) What are the advantages of two pipe system of plumbing? [4]
- c) Differentiate BOD and COD. [3]
- d) What do you mean by suspended growth process? [4]
- e) What is the working principle of septic tank? [4]
- f) What do you mean by sludge thickening? [4]

PART-B (3x16 = 48 Marks)

2. a) Draw two suitable surface drain sections and explain their advantages and disadvantages. [8]
- 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 methods of plumbing and explain any one in detail. [8]
- b) Write a note on the Building drainage system. [8]
4. a) What do you understand of sedimentation of wastewater? Describe in brief various types of settlings. [8]
- b) Design a primary sedimentation tank for a proposed sewage treatment plant of 120 ML/d capacity. [8]
5. a) Differentiate clearly between attached growth processes and suspended growth processes. List various treatment techniques falling under each such process. [8]
- b) State advantages and disadvantages of a conventional trickling filter. [8]
6. a) Write a note on disposal methods of septic tank effluent. [8]
- b) Design a septic tank with neat sketch for a hostel having 250 students. Design sewage flow is 60 Lpcd. What would be the size of the dispersion trench, if the effluent from the septic tank is to be discharged in it? Draw a neat sketch of the septic tank with dispersion trench. [8]
7. a) What do you understand by Oxygen-Sag Curve? Derive Streeter-Phelps Equation. [8]
- b) What is Sewage Farming? What are its advantages over the method of disposal of sewage by Dilution? [8]



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PART-A (22 Marks)

1. a) What are the advantages of Combined system? [3]
- b) Enumerate the systems of plumbing and mention their suitability. [4]
- c) What are the general characteristics of sewage? [4]
- d) What do you mean by attached growth process? [4]
- e) What are the disposal methods of septic tank effluent? [4]
- f) What is sewage sickness? [3]

PART-B (3x16 = 48 Marks)

2. a) What do you mean by variation in flow of sewage? Explain average flow, dry weather flow, and maximum flow. [8]
- b) A 30 cm diameter 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? [8]
3. a) Draw a layout of pumping station and explain the different components. [8]
- b) What are the different types pumps used in the wastewater handling and explain their suitability? [8]
4. a) What is a Grit Chamber? Describe with the help of neat sketches a horizontal flow grit Chamber. [8]
- b) For a wastewater sample, the 5 day BOD at 20⁰ C is 200 mg/l and is 67% of the ultimate. What will be 4-day BOD at 30⁰ C. [8]
5. a) Give various flow diagrams used for single stage and two stage trickling filters. How do you determine the efficiency of these, using Rankin's equation? [8]
- b) Give the flow diagram for the "activated sludge process" and describe its working. [8]
6. a) What do you understand by physical Unit operations? Write a note on applications of various physical Unit operations employed in Sewage treatment. [8]
- b) Design a Septic tank for a hostel with the following data:
 - Number of Users = 150
 - Peak discharge = 205 lpm
 - Desludging period = 1 year.
 Assuming the population rate as 20 minutes per cm design dispersion trench system for the disposal of the septic tank effluent. [8]
7. a) Write note on Sludge Conditioning. Why elutriation is necessary prior to Chemical Conditioning. [8]
- b) What do you understand by thickening (or) concentration of sludge? List the various methods of sludge thickening. Describe with the help of neat sketch gravity-sludge thickener? [8]

