

## CBGS SCHEME

USN 

--	--	--	--	--	--	--	--	--	--

15CV71

**Seventh Semester B.E. Degree Examination, Aug./Sept.2020**  
**Municipal and Industrial Waste Water Engineering**

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. Draw neat sketches wherever necessary.  
 3. Assume suitable data wherever necessary.*

**Module-1**

- 1 a. Discuss briefly types of Sewerage System. (05 Marks)  
 b. Explain the various types of materials used for sewer construction. (05 Marks)  
 c. Compute the population served, drainage area and diameter of storm water sewer (outfall) for the following data:  
 For Sanitary sewer:  
 "Flowing full" discharge =  $0.02 \text{ m}^3/\text{s}$   
 "Design" discharge (per capita) =  $1.5114 \text{ m}^3/\text{person}/\text{day}$   
 For Drainage area and Outfall sewer:  
 Population density = 75 persons per hectare  
 Coefficient of runoff =  $C = 0.278$  (for area, A in  $\text{km}^2$ )  
 Intensity of rainfall = 107 mm/hour (Based on 10 year rainfall frequency curve and time of concentration = 20 minutes)  
 Velocity of flow in storm sewer =  $3.0 \text{ m/s}$  (Discharge measured in  $\text{m}^3/\text{s}$ ). (06 Marks)

OR

- 2 a. Explain with a neat diagram Drop Manhole. (05 Marks)  
 b. Illustrate the working principle of oxidation pond as a Low Cost Treatment Method. (05 Marks)  
 c. A city has three streams carrying waste water with discharges of 350 MLD, 300 MLD and 250 MLD.  $\text{BOD}_{5d, 20^\circ\text{C}}$  of streams are 300 mg/L, 290 mg/L and 270 mg/L respectively. Compute the BOD loading (total) in tons per annum. If TSS/BOD Ratio = 1.3, determine total TSS loading. (06 Marks)

**Module-2**

- 3 a. A 3m diameter circular sewer discharges  $3 \text{ m}^3/\text{s}$  of sewage into a pump well. The waste water level in the pump well rises to full depth of 3 m above invert of incoming sewer. Assuming Manning's value of 0.012 and gradient of 0.5/1000 determine the velocity of flow and ratio of discharge (q) to full discharge ( $Q_{\text{full}} = 10.856 \text{ m}^3/\text{s}$ ). (05 Marks)  
 b. Explain the self purification of streams with a Sag curve. (05 Marks)  
 c. Discuss the various flow-friction formulae used in design of sewers. (06 Marks)

OR

- 4 a. Find out where critical DO occurs in a fully saturated river (with DO) for the following data:  
 City discharge =  $100 \text{ m}^3/\text{s}$   
 Minimum river discharge =  $1250 \text{ m}^3/\text{s}$ ; Minimum velocity in river =  $0.15 \text{ m/s}$   
 $\text{BOD}_{5d, 20^\circ\text{C}} = 260 \text{ mg/L}$ ; Coefficient of purification of river = 4.0  
 Coefficient of DO = 0.11  
 Ultimate BOD = 125% of BOD of mixture of sewage and river water. (05 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

15CV71

- b. Explain the term "Zone of Purification" in a river. (05 Marks)  
c. Derive the Streeter-Phelps Oxygen Sag equation in river analysis. (06 Marks)

**Module-3**

- 5 a. Explain the various waste water characteristics. (05 Marks)  
b. Distinguish between Grab sampling and Composite sampling. (05 Marks)  
c. Draw a neat flow diagram of a domestic sewage treatment plant showing various unit operations and unit processes and briefly explain. (06 Marks)

**OR**

- 6 a. Explain with a neat sketch working of a Trickling filter. (05 Marks)  
b. Distinguish between suspended growth and fixed film biological processes. (05 Marks)  
c. Design a set of two rectangular primary settling tanks for type-I settling of sewage for an average flow of 20000 m<sup>3</sup>/d, design SOR of 40m<sup>3</sup>/m<sup>2</sup>.d. Draw a neat sketch of the same. Assume peak flow = 2.5 times average flow check whether the design ensures safety against re-suspension if max. scour velocity = 0.06 m/s. (06 Marks)

**Module-4**

- 7 a. Discuss the effect of effluent discharge on streams. (05 Marks)  
b. Explain the terms volume reduction and strength reduction of industrial waste water. (05 Marks)  
c. How is shock loading on treatment plants prevented using equalization and proportioning. (06 Marks)

**OR**

- 8 a. Explain the advantages and disadvantages of combined treatment of industrial waste with domestic waste water. (05 Marks)  
b. Discuss the methods of removal of "inorganic solids" from industrial waste water. (05 Marks)  
c. Explain the methods of maintaining quality in a stream using effluent and stream standards. (06 Marks)

**Module-5**

- 9 a. Explain the effect of dairy waste on receiving streams and give a treatment proposal. (05 Marks)  
b. Explain the treatment of cane sugar effluent with the help of a flow chart. (05 Marks)  
c. Explain the role of anaerobic stabilization ponds as energy efficient method of treating distillery waste. (06 Marks)

**OR**

- 10 a. Give the schematic flow diagrams of cotton textile industry showing the generation of wastewater. (05 Marks)  
b. Give the typical characteristics of Indian tannery industrial waste water. (05 Marks)  
c. Tuna fish canning industry is proposed near the coast. What are the expected operations leading to discharge of waste? Also give the treatment strategy. (06 Marks)

\*\*\*\*\*

2 of 2

## CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

15CV71

**Seventh Semester B.E. Degree Examination, June/July 2019**  
**Municipal and Industrial Waste Water Engineering**

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. Any missing data can be assumed.*

Module-1

- 1 a. Define sanitation. Mention advantages and disadvantages of different methods of sewage disposal. (08 Marks)  
 b. Name different types of sewage system with their advantages and disadvantages. (08 Marks)

OR

- 2 a. With sketch explain shapes of sewers. (08 Marks)  
 b. Draw a neat plan showing house drainage connections with labeling parts. (08 Marks)

Module-2

- 3 a. What is self purification of stream? With sketch, explain oxygen sag curve. (08 Marks)  
 b. With sketch explain zones of purification. (08 Marks)

OR

- 4 a. What is sewage sickness? Mention methods used to prevention of sewage sickness? (08 Marks)  
 b. A wastewater effluent of 560 l/sec with BOD = 50 mg/l, dissolved oxygen = 3.0 mg/l and temperature of 23°C enters a river where the flow is 28 m<sup>3</sup>/sec and BOD = 4.0 mg/l, D.O = 8.2 mg/l and temperature is 17°C. K<sub>1</sub> of the waste is 0.1 per day at 20°C. The velocity of water in the river downstream is 0.18 meter/sec and depth of 1.20 mts. Determine following after mixing of waste water with the river (i) Combined discharge (ii) BOD (iii) D.O (iv) Temperature. (08 Marks)

Module-3

- 5 a. Draw a flow diagram of municipal waste water treatment plant with their operation units. (08 Marks)  
 b. Briefly explain characteristics of domestic waste water. (08 Marks)

OR

- 6 a. List the difference between activated sludge process and trickling filters. (08 Marks)  
 b. With sketch explain grit chamber and skimming tank. (08 Marks)

Module-4

- 7 a. Mention the differences between domestic waste water and industrial waste water. (08 Marks)  
 b. Write note on:  
 i) Volume reduction  
 ii) Strength reduction  
 iii) Neutralization  
 iv) Equalization (08 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

15CV71

OR

- 8 a. What are the merits and demerits of municipal and industrial waste water combined treatment methods. (08 Marks)  
b. Briefly explain methods used to removal of organic and inorganic salts from waste water. (08 Marks)

Module-5

- 9 a. Explain with flow diagram, treatment option for distilleries plant. (08 Marks)  
b. With the help of flow chart, mention sources and characteristics of waste water from tannery. (08 Marks)

OR

- 10 a. Explain with flow diagram, treatment option for sugar mills. (08 Marks)  
b. With the help of flow chart, mention sources and characteristics of waste water from pharmaceutical industry. (08 Marks)

\*\*\*\*\*

©t

LIBRARY  
CHIKOC

USN

--	--	--	--	--	--	--	--	--	--	--	--

15CV71

**Seventh Semester B.E. Degree Examination, Dew4,,ver—T/Jan.2020**  
**Municipal and Industrial Wastewater Engineering**

Time: 3 hrs.

Max. Marks: 80

**Note:** 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Assume any suitable missing data.

**Module-I**

- 1 a. Explain briefly the different types of sewerage system. (06 Marks)
- b. Explain the various factors affecting the dry weather flow. (04 Marks)
- c. The drainage area of one sector of a town is 20 hectares. The classification of the surface of this area is as follows :

% Total surface area	Type of surface	Run — off coefficient
25	Hard pavements	0.85
25	Roof surface	0.80
15	Unpaved street	0.30
25	Gardens and Lawns	0.15
10	Wooded area	0.10

If the time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of rainfall  $R = 900/(t + 60)$ . (06 Marks)

**OR**

- 2 a. Briefly explain the essential requirements of a good sewer material. (04 Marks)
- b. Explain with a neat sketch, working of an "oxidation pond". (06 Marks)
- c. Explain with a neat sketch, construction and working of a manhole. (06 Marks)

**Module-2**

- 3 a. Briefly explain self cleaning velocity and non scouring velocity. (04 Marks)
- b. State the hydraulic formulas for velocity which are commonly adopted in the design of sewers. Explain any one in brief. (06 Marks)
- c. A stone — ware sewer having 30cm in diameter is laid at a gradient of 1 in 100 use  $N = 0.013$  in Manning's formula. Calculate the velocity, discharge and Chezy's co-efficient when the sewer is running full. (06 Marks)

**OR**

- 4 a. Explain the phenomenon of self— purification of natural streams subjected to pollution with the help of oxygen — sag curve indicating the salient features. (10 Marks)
- b. The sewage of a town is to be discharged into a river. The quantity of sewage produced per day is 8 million liters and its BOD is 250 mg/C. If the discharge in the river is 200 f/s and if its BOD is 6mg/C, find the B.O.D of the diluted water. (06 Marks)

**Module 3**

- 5 a. Write the flow diagram employed to treat municipal waste water and indicate the importance of each treatment unit. (08 Marks)
- b. With a neat sketch, explain the working of a grit chamber and skimming tank. (08 Marks)

15CV71

**OR**

- 6 a. Explain with a neat sketch, the working principles of a trickling filter. (08 Marks)  
b. Briefly explain the terms : i) Suspended growth ii) Activated sludge  
iii) Sludge digester iv) Sequential batch reactors. (08 Marks)

**Module-4**

- 7 a. Explain the effects of effluent discharge on the stream water quality. (08 Marks)  
b. What is meant by strength reduction? Explain the various methods of strength reduction being adopted in the industries. (08 Marks)

**OR**

- 8 a. List and explain the methods of removal of colloidal solids from wastewater. (08 Marks)  
b. Explain the principles of raw and partially treated wastes before discharged into streams. (08 Marks)

**Module-5**

- 9 a. With the help of a flow diagram, explain the treatment units suggested to treat wastewater from a tanning industry along with wastewater characteristics. (08 Marks)  
b. State the sources and characteristics of the wastewater from dairy industry. (08 Marks)

**OR**

- 10 a. With the help of a line diagram, explain the process of paper and pulp industry highlighting the sources of wastewater generation. (08 Marks)  
b. Discuss the characteristics and treatment of waste water from a pharmaceutical industry. (08 Marks)

**Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Municipal and Industrial Wastewater Engineering**

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

**Module-1**

- 1 a. Explain the need for Good sanitation. Describe types of sewerage system and their suitability. (10 Marks)  
b. Explain factors affecting wet weather flow and the effects of flow variations on the design of sewerage system. (06 Marks)

**OR**

- 2 a. Define Sewer Appurtenances and explain with neat sketch construction and working of manhole. (06 Marks)  
b. What do you understand by the term Low – cost treatment? (02 Marks)  
c. Explain the following with sketches :  
i) Septic tank      ii) Oxidation pond. (08 Marks)

**Module-2**

- 3 a. Explain briefly the dilution method of disposal of sewage. What are the factors which influence the choice of the method to be adopted? (06 Marks)  
b. Design a sewer to serve a population of 36,000, the daily per capita water supply allowance being 135 lt, of which 80%, find its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow, when running full. What would be the velocity of flow in the sewer when running full? (10 Marks)

**OR**

- 4 a. Discuss in details the process Deoxygenation and Reoxygenation with respect to self – purification of Natural water with a neat sketch. (08 Marks)  
b. Write short notes on :  
i) Sewage sickness      ii) Sewage farming. (08 Marks)

**Module-3**

- 5 a. Write the flow diagram employed for a municipal wastewater treatment plant. Indicate the importance of each unit indicated in the flow diagram. (10 Marks)  
b. Explain the importance of screens and types of screens in the sewage treatment process. (06 Marks)

**OR**

- 6 a. Determine the size of the High rate Tricking Filters for the following data :  
i) Sewage flow = 4.5 MLD      ii) Recirculation ratio = 1.5  
iii) BOD of Raw sewage = 250 mg/L      iv) BOD removal in primary tank = 30%.  
v) Final effluent BOD desired = 30 mg/L. (08 Marks)  
b. Explain briefly the different stages of sludge digestion process in a “Digester”. With a neat sketch, explain the constructional details of sludge digestion tank. (08 Marks)

**Module-4**

- 7 a. Differentiate between Domestic sewage and Industrial waste. (08 Marks)  
b. Explain the methods used for Neutralization of Acidic and Alkaline waste. (08 Marks)

**OR**

- 8 a. Briefly explain the effects of Industrial wastewater on sewage treatment plants. (08 Marks)  
b. Explain different methods of Strength Reduction. (08 Marks)

**Module-5**

- 9 a. With process flow diagram, explain the cotton textile mill wastes origin. (08 Marks)  
b. Enumerate the effects of discharging paper and pulp industrial wastes into water bodies or sewers. (08 Marks)

**OR**

- 10 a. With process flow diagram, explain the origin of wastes from Cane Sugar mill. List its characteristics. (08 Marks)  
b. With a flow diagram, explain the units used for treatment of Dairy waste on receiving stream. (08 Marks)