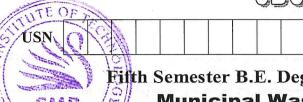USN | | | | | | | | | |

18CV55

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Municipal Wastewater Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Explain the necessity of treating waste water. **(08 Marks)**
   b. Explain with a neat sketch, construction and working of a manhole. **(08 Marks)**
   c. Explain the principles of house drainage. **(04 Marks)**

OR

2 a. Define wet weather flow. Explain factors affecting wet weather flow. **(08 Marks)**
   b. The drainage area of one sector of a town 100 hectares having a population of one lakh persons, the rate of water supply is 150 LPCD, 80% of which flows out as sewage. The peak flow of sewage is 2.5 times the average flow. The area of the town is classified as follows:

Percentage of total area	Type of Surface	Run off coefficient
45	Hard pavements and roofs	0.85
20	Unpaved	0.45
20	Garden and lawn	0.25
15	Wooded area	0.15

If time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of Rainfall $R = \dfrac{900}{(t+60)}$. **(08 Marks)**
   c. What are traps? Explain the importance of traps. **(04 Marks)**

Module-2

3 a. Write the flow diagram employed to treat municipal waste water and indicate the importance of each treatment unit. **(08 Marks)**
   b. Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm diameter with sand particle of 1 mm diameter and specific gravity 2.66. Assume $\beta = 0.06$ and $f = 0.02$. Assume the sewer to run half full. Take $N = 0.012$. **(08 Marks)**
   c. What is sampling? Mention types of sampling. **(04 Marks)**

OR

4 a. Explain the concept of BOD and COD. Enumerate their limitation. **(08 Marks)**
   b. The BOD of a sewage incubated for one day at 30°C has been found to be 100 mg/l. What will be the 5 day 20°C BOD? Assume $K = 0.12$ (Base 10) at 20°C. **(08 Marks)**
   c. Briefly explain self cleansing velocity. **(04 Marks)**

Module-3

5 a. Discuss the importance of screening in waste water treatment operation and explain types of screens. **(08 Marks)**
   b. What do you understand by self purification of natural water bodies? Explain the factors affecting self purification. **(08 Marks)**
   c. Explain sewage farming. Mention the various methods of sewage farming. **(04 Marks)**

OR

6 a. With neat sketch, explain the different zones of self purification. **(08 Marks)**

b. A stream saturated with DO, has a flow of 1.2 m^3/s, BOD of 4 mg/l and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m^3/s having BOD 20 mg/l DO 5mg/l and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/s. Calculate the DO deficit at point 20 km downstream. Assume that the temperature is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/l. **(08 Marks)**

c. Draw a neat sketch of skimming tank. Enumerate importance of skimming tank. **(04 Marks)**

Module-4

7 a. Explain with neat sketch the working of Trickling Filter. What is the principle on which it working? **(08 Marks)**

b. Explain the different stages involved in the sludge digestion process. **(08 Marks)**

c. Briefly explain R.B.C. **(04 Marks)**

OR

8 a. Mention the various types of modification of ASP and explain any two methods in brief. **(08 Marks)**

b. Design suitable dimensions of a circular trickling filter units for treating 5 million litres of sewage per day BOD of sewage is 150 mg/l. **(08 Marks)**

c. Write short note on drying beds. **(04 Marks)**

Module-5

9 a. Discuss in brief the Nitrification and Denitrification process in advance waste water treatment. **(08 Marks)**

b. Draw a neat sketch of septic tank. Write the design criteria required for septic tank. **(08 Marks)**

c. Write a short note on advance oxidation process. **(04 Marks)**

OR

10 a. Discuss in brief the biological and chemical methods of removal of phosphorous from waste water. **(08 Marks)**

b. Write short notes on:
(i) Electro coagulation
(ii) Soak pits
(iii) Eco toilets **(12 Marks)**

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