320733(20)

B. E. (Seventh Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Civil Engg. Branch)

ENVIRONMENTAL ENGINEERING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt part (a) of all questions (2 marks).
*Attempt any **two** out of **three** from part-'b'.*
[(2+2×7)×5=80 marks]

Unit-I

1. (a) Define the term self cleansing velocity. Write and explain each term in the stokes equation with their

appropriate design values for circular concrete sewers?

(b) A populations of 36,000 is residing in a town having an area of 62 hectares. If the average coefficient of runoff for this area is 0·6 and the time of concentration of the design rain is 30 minutes, calculate the discharge for which sewers of a proposed combined system will be designed?

(c) Derive the hydraulic elements of a circular sewer.

(d) A 50 cm diameter sewer is to discharge 0·07 cumecs at a velocity as self-cleansing as a sewer flowing full at 0·85 m/sec. Find the depth and velocity of flow and the required slope. Take uniform value of N = 0·015.

Unit-II

2. (a) Draw BOD curve for a domestic waste water sample and list various segments on it.

(b) Explain the purpose of the grit chamber. What is the logic that governs its design? Determine the dimensions (length × width × depth) and detention

time for a grit chamber for a maximum waste water flow of 8000 m³/day to remove particles having average settling velocity of 0·02 m/sec for a constant flow through velocity of 0·3 m/sec maintained by provision of proportional flow weir.

(c) Explain the type-II settling adopted for the design of primary settling tank. Describe the settling column test to determine the relevant data for the design of the PST.

(d) Explain the treatment mechanism in a septic tank and soak pit with sketches. What are the precautions that should be taken while constructing the septic tank to ensure its efficiency?

Unit-III

3. (a) Define MCRT. List factors affecting slugde digestion.

(b) Write notes on the following : (with neat labeled diagrams)

   (i)   Activated Sludge Process

   (ii) Oxidation ditch

   (iii) Facultative Lagoon

(c) Design the activated sludge unit treatment with following data for a town of population of 65,000.

(c) A single stage filter is designed for an organic loading of 15,000 kg of BOD in raw sewage per hectare meter per day with a recirculation ratio of 1·8. This filter treats a flow of 8 MLD of raw sewage with a BOD of 320 mg/L. Using NRC model, determines the strength of the effluent.

Unit-IV

4. (a) Show the flow diagram of "Algal-bacterial Symbiosis"?

(b) A town disposes sewage by land treatment. It has a sewage farm of area 350 hectares. The area includes an extra provision of 50% for rest and rotation. The population is 62,000 and water supply rate is 130 lpcd. If 70% of water is converted into sewage, determine the consuming capacity of the land?

(c) A sewage containing 200 mg/L of suspended solids is passed through primary settling tanks, trickling

filters and secondary sedimentation tanks. How much gas will pro2bably be produced in the digestion of sludge from two million litre of sewage?

(d) Why there is need to adopt effluent standards for waste water disposal in surface water bodies? Why these standards differ for disposal into a public sewer? What are stream standards?

Unit-V

5. (a) Give a general idea about the per capita per day quantity of solid waste generated in India and some western countries.

(b) Explain the solid waste management methods like land filling and pyrolysis.

(c) Explain the 4R's of SWM in detail.

(d) Explain the term "Composting". Give the different type of composting in use, and describe any one with the aid of sketch.