

B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM 2022

INDUSTRIAL WATER POLLUTION AND CONTROL

Time: 4 hours

Full Marks: 70

Use separate answer scripts for each part

(35 marks for each part)

Part-I

Answer question no.1 and any one from the rest

1.	a. What are the two main categories of effluent generating industries? Describe briefly with examples. b. Write short notes on grab sample and composite sample. c. Briefly describe the objectives of equalization tank.	6+4+5
2.	What are the different sources of wastewater from tanneries and what is the composition of the wastewater? Suggest a suitable treatment methodology for tannery wastewater.	20
3.	What are the different sources of wastewater from pulp and paper industries and what is the composition of the wastewater? Suggest a suitable treatment methodology for wastewater from pulp and paper industries.	20

Ref. No. : Ex/CE/PE/B/T/422G/2022

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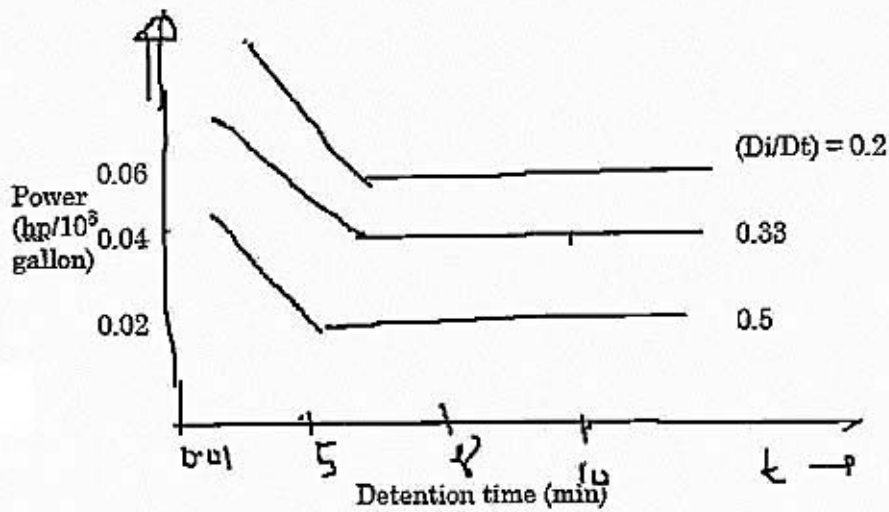
Use separate answer scripts for each part

Part-II

[Answer Question No.1 and any three from the rest]

Full Marks: 35

- 1) What are the different sources of wastewater from meat processing industries and what is the composition of the wastewater? Suggest a suitable treatment methodology for wastewater from meat processing industries. [11]
- 2) Design an API separator for Indian oil refineries with an average flow rate of 280 m³/hr. [Assume any necessary data within the range]. [8]
- 3) Waste water from a Galvanizing shock industry is found to be highly acidic and requires neutralization prior to secondary treatment. The flow rate of waste water is 0.3 m³/min, pH is 1.5. This flow is to be required to rise a pH of 7 by using lime. From titration curve it is observed that 1st stage requires 2500 mg/ltr and second stage requires 200 mg/ltr. Retention time is 5 – 10 min. Lime slurry consistency is 6-8 %. Assume depth of the tank in the range of 1.2 to 2 meter. Determine :
 - I. Quantity of lime to be used.
 - II. Lime slurry storage tank volume.
 - III. Find out the power requirement of the mixture [8]



4) Design a flotation thickener without and with pressurized recycle to thicken the solids in activated sludge mixed liquor from 0.3 to 4%. Assume the following conditions:

- i. $\frac{A}{S} = 0.008 \text{ ml/mg}$
- ii. Air solubility: 18.7 ml/ltr
- iii. Recycled system pressure: 275 kPa
- iv. Fraction of saturation = 0.5
- v. Surface loading rate: 8 ltr/m²-min
- vi. Sludge flow rate : 400 m³/day

[8]

4. Briefly discuss about the different types of neutralization methods for industrial waste water. [8]

5. Briefly discuss about the different types heavy metal removal process for industrial waste water? [8]