Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022

(2020 SCHEME)

Course Code : 20CHT393

Course Name: Physico-Chemical Methods in Environmental Engineering

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. List any six physical and chemical qualities of water.
2. Differentiate between coagulation and flocculation.
3. Briefly explain the effluent standards and their salient features.
4. List out any three secondary treatment methods and mention the conditions at which these methods are applied.
5. List out the types of equalisation processes and its applications.
6. Write short note on dissolved air floatation.
7. List the factors influencing adsorption kinetics.
8. Explain the chemical disinfection methods.
9. Write short note on electrodialysis.
10. Differentiate between anionic and cationic ion exchangers with two examples.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Explain the principle behind the conventional filtration operation. Which are the commonly utilized conventional filtration methods in a wastewater treatment plant? (7)
    b) List out any seven physico-chemical treatment methods applied in a wastewater treatment plant. Also mention the role of each method. (7)

OR

12. a) Write short note on the different types of settling. (6)
    b) Design a rectangular sedimentation tank to treat 2.4 million litres of raw water per day. Assume detention period as 3 hours and tank depth as 3 m. (8)

MODULE II

13. With a neat flow diagram explain the treatment sequence in a wastewater treatment plant. (14)

OR

14. a) List out any six physical and chemical characteristics of wastewater and mention the impact of each on the water quality. (6)
    b) List the major contaminants found in the effluent from a particular industry. Suggest suitable methods for removing these contaminants. (8)

MODULE III

15. a) With a neat flow diagram explain the lime-soda softening process. (8)
    b) Explain various types of screens used in wastewater treatment. (6)

OR

16. a) Explain the types of grit chambers with a neat diagram. (6)
    b) Design a grit chamber for a population of 50,000 with water consumption of 150 litres per capita per day (LPCD). Sewage generation is around 80% of the water supply. Make suitable assumptions for any missing data if required. (8)

MODULE IV

17. Define the terms adsorption and adsorption isotherm. Explain Langmuir, Freundlich and BET adsorption isotherms. (14)

OR

18. Explain the chemical and nonchemical methods of disinfection. (14)

MODULE V

19. a) With a neat sketch explain the working of reverse osmosis. (7)
    b) Explain demineralization of wastewater by ion exchange method. (7)

OR

20. a) Define ultra-filtration. Explain the types of ultra-filtration membranes used and their desired properties. (7)
    b) What is membrane fouling? State the sources of fouling and remedies. (7)

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