

# P. P. SAVANI UNIVERSITY

Third Semester of B.Sc. Examination  
December-2021

SSES2070-Physico-Chemical Treatment of Wastewater

09.12.2021, Thursday Time: 09:00 a.m. to 11:30 a.m. Maximum Marks: 60

## Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

## Section-I (Total Marks - 30)

### Q.1 Short Questions [10]

#### 1.1 Objectives [05]

1.1a \_\_\_\_\_ treatment remove materials in initial level which could damage equipment or interfere with a process.

- A Grit chamber
- B Screening
- C Oxidation
- D Reduction

1.1b What is the most common used coagulant?

- A Alum
- B Ferric sulphate
- C Limestone
- D Coal

1.1c The \_\_\_\_\_ represents the heavier inert matter in wastewater.

- A Sewage
- B Waste
- C Screens
- D Grit

1.1d Which of the following represents the physical characteristics of water?

- A Chloride
- B BOD
- C Turbidity
- D COD

1.1e A process of contact and adhesion whereby the particles of a dispersion form larger-size clusters is called

- A Coagulation
- B Flocculation
- C Sedimentation
- D Suspension

1.1f What does Chemical Oxygen Demand (COD) indicate?

- A Biodegradability of the wastewater
- B Strength of pollution in sewage
- C Age of the sewage

- D Potential for recycling of the wastewater
- 1.1g Which of the following is not the chemical characteristics of wastewater?
- A Sulphate
  - B Alkalinity
  - C Total solids
  - D Chlorides
- 1.1h The Standard BOD of water is taken for
- A 1 day
  - B 2 days
  - C 5 days
  - D 7 days
- 1.1i What is the movement of solids in water called?
- A Motion
  - B Brownian motion
  - C Horizontal motion
  - D Viscous motion
- 1.1j Which of the following are included in wastewater contaminants?
- A Suspended solids
  - B Pathogenic bacteria
  - C Both A and B
  - D None of the above

1.2 Answer the Following.

[05]

- 1.2a The angle of inclination in coarse screen is \_\_\_\_\_.
- 1.2b Contact time in the rapid-mix chamber is typically 1 to 5 minutes.  
True  
False
- 1.2c \_\_\_\_\_ force prevents colloids from agglomeration.
- 1.2d Acidic pH can be neutralized by using \_\_\_\_\_.
- 1.2e Define: Flocculation.

Q.2 Short Notes (Attempt any two)

[06]

- A What is head loss? Write the equation to calculate head loss through clean bar flat screen.
- B Explain the difference between coagulation and flocculation
- C Illustrate the objectives of Grit Chamber.

Q.3 Explain in detail (Attempt any two)

[14]

- A Enlist Physical, Chemical and Biological characteristics of wastewater and explain any two from physical and chemical characteristics each.
- B Differentiate between fine, coarse and medium screen.
- C Explain the types of flocculators in detail.



Section-II (Total Marks - 30)

Q.1 Short Questions

[10]

1.1 Objectives

[05]

- 1.1a Size range of Micro flocculation is \_\_\_  $\mu\text{m}$ .
- A 0.001-1
  - B 0.01-1
  - C 0.1-1
  - D >1
- 1.1b Coagulants added to wastewater is \_\_\_ charged.
- A Positively
  - B Negatively
  - C Neutral
  - D None
- 1.1c When temperature of water decreases, the rate of settling is \_\_\_\_
- A Faster
  - B Slower
  - C No Change
  - D Very fast
- 1.1d \_\_\_ zone of sedimentation tank should provide smooth transition from sedimentation zone to the outlet of the tank.
- A Inlet
  - B Settling
  - C Sludge
  - D Outlet
- 1.1e RSF contains \_\_\_ inches of Sand.
- A 24-30
  - B 26-35
  - C 20-25
  - D 20-40
- 1.1f Which of the following is an example of Physical Agent for Disinfection?
- A Ozone
  - B Trickling Filter
  - C Heat
  - D Chlorine
- 1.1g Which microorganism is responsible for food poisoning?
- A *E-Coli*
  - B *Salmonella*
  - C *Entamoeba histolytica*
  - D *Giardia lamblia*
- 1.1h \_\_\_ disinfecting agent can be used to alter the colloidal nature of the protoplasm.
- A Heat
  - B Phenolic compounds
  - C Chlorine
  - D UV radiation

1.1i \_\_\_ is the color of chlorine gas.

- A Greenish orange
- B Yellow
- C Greenish yellow
- D Green

1.1j UV-C radiation used for disinfection of water is also known as \_\_\_ radiation

- A Near UV
- B Middle UV
- C Far UV
- D UV

1.2 Answer the Following

[05]

1.2a Mention any one example of inorganic coagulant.

1.2b Type II settling is also known as \_\_\_

1.2c Mention the types of sedimentation tanks.

1.2d Presence of \_\_\_ in disinfection stage will reduce its efficiency and will act as shield for entrapped microorganism.

1.2e \_\_\_ disinfectant will inhibit the enzyme activity of microorganism.

Q.2 Short Notes (Attempt any two)

[06]

A Differentiate between Coagulation and Flocculation.

B Write a note on High-rate Dual media filter.

C Write a note on Disinfection using Ozone.

Q.3 Explain in detail (Attempt any two)

[14]

A Write a note on Types of settling in sedimentation tank.

B Write a note on Filter clogging problems due to improper backflushing.

C Write a note on Disinfection using chlorine and its compounds.