

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-IV EXAMINATION – WINTER 2025****Subject Code:3141309****Date:15-11-2025****Subject Name:Fundamentals of Wastewater Quality****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1*	(a) Write a brief note on “Binary Mixture.”	03
	(b) State and explain Le Chatelier’s principle in brief.	04
	(c) Explain the principle of Solvent Extraction.	07
Q.2	(a) Define Heterocyclic compound and give 3 examples of it.	03
	(b) Define the following terms (i) Catalysis (ii) adsorption (iii) osmosis (iv) dialysis	04
	(c) Write a detail note on “Solubility product”	07
	OR	
	(c) The solubility of CaF_2 is 0.015 M at 25°C. Calculate the Solubility Product i.e. K_{sp} for CaF_2 .	07
Q.3	(a) Define the following terms (i) Enzymes (ii) Cofactors (iii) Mineralization	03
	(b) Write a short note on “Biochemistry of proteins.”	04
	(c) Calculate Theoretical COD value of (i) 3500 mg/l of glucose (ii) 3100 mg/l of acetic acid	07
	OR	
Q.3	(a) Define the following terms (i) Smoke (ii) Foams (iii) Fog	03
	(b) Define with suitable examples: Primary alcohol (ii) Secondary alcohol (iii) tertiary alcohol	04
	(c) State and explain general properties of colloids.	07
Q.4	(a) State the role of following chemical in the determination of DO. (i) NaN_3 (ii) $\text{Na}_2\text{S}_2\text{O}_3$ (iii) MnSO_4	03
	(b) State the difference between COD and BOD.	04
	(c) Explain open reflux method for measurement of COD.	07
	OR	
Q.4	(a) Enlist 4 industries that contribute oil and grease content in wastewater.	03
	(b) State the limitation of COD determination process.	04
	(c) Explain dilution method to determine BOD of wastewater.	07
Q.5	(a) Enlist the applications of volatile acid data.	03
	(b) Explain the “Smothering” action when wastewater contain high amount of grease.	04

- (c) Explain the analytical procedure used to determine oil and grease content in wastewater. **07**

OR

- Q.5** (a) Enlist the various analytical methods used to determine the sulfate concentration. **03**
- (b) State the significance of a high sulfate concentration in water supply system and in wastewater disposal. **04**
- (c) Define volatile acid. Enlist the methods used to determine volatile acids and explain any one in brief. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-IV (NEW) EXAMINATION – WINTER 2024****Subject Code:3141309****Date:21-11-2024****Subject Name: Fundamentals of Wastewater Quality****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

Marks

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|------------|--|-----------|
| Q.1 | (a) What is activity and activity co-efficient? | 03 |
| | (b) Write a short note on binary mixtures and explain its classes with examples. | 04 |
| | (c) Explain standard procedure of COD determination. | 07 |
| Q.2 | (a) Define the following terms (i) Enzymes (ii) Cofactors (iii) Mineralization | 03 |
| | (b) State Hardy Schulze Law and its importance in wastewater treatment. | 04 |
| | (c) Explain the following terms in detail (i) Tyndall effect (ii) Brownian movement. | 07 |
| | OR | |
| | (c) Explain modified Winkler method for DO determination. | 07 |
| Q.3 | (a) Which factors affect the solubility of oxygen in water? | 03 |
| | (b) Enlist standard methods for the determination of sulfates in water and waste water explain any one of them in brief. | 04 |
| | (c) Classify the types of alcohols and explain each with example. | 07 |
| | OR | |
| Q.3 | (a) How are methyl orange acidity and phenolphthalein acidity related to mineral acidity and total acidity. | 03 |
| | (b) What do you understand by complex ions? Explain with example how different equilibrium constant are there for a complex ion. | 04 |
| | (c) Write a note on biodegradation of organic compounds. | 07 |
| Q.4 | (a) List five requirements of a satisfactory dilution water for BOD analysis. | 03 |
| | (b) What is the purpose of digestion of the sample in the gravimetric analysis for sulphate? | 04 |
| | (c) Explain Aliphatic and Aromatic compounds with examples. | 07 |
| | OR | |
| Q.4 | (a) Discuss the significance on volatile-acids in Environment. | 03 |
| | (b) What limit is placed on nitrogen content of drinking water and why? | 04 |
| | (c) Identify the role of carbohydrates in higher animals. Explain the mechanism by which carbohydrates are converted to simple sugar with equations. | 07 |
| Q.5 | (a) Describe the significance of particle size in Solution of solid in liquid. | 03 |
| | (b) Explain environmental significance of Solids. | 04 |
| | (c) Explain the any one standard procedure of determination of oil and grease present in wastewater. | 07 |
| | OR | |
| Q.5 | (a) Explain in brief physisorption and chemisorptions. | 03 |
| | (b) Mention the Principle of Osmosis and Reverse Osmosis. | 04 |
| | (c) Identify functional group is associated with Aldehyde, Ketone and Alcohol. Explain the nomenclature of each with example. | 07 |

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:3141309****Date:17-01-2024****Subject Name: Fundamentals of Wastewater Quality****Time: 10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) State Le Chatelier's principle.	03
	(b) Classify the colloids based on nature of interaction between Dispersed Phase and Dispersion Medium.	04
	(c) Explain the sources and respective environmental significance of oil and grease in receiving waters.	07
Q.2	(a) Explain the Environmental Significance of Oil & Grease.	03
	(b) Define Conductivity. State the Ohm's law with application in Environmental Engineering field.	04
	(c) Enlist the reagents are used in determination of COD. Highlight the importance of each along with reaction chemistry.	07
	OR	
	(c) Classify the colloids based on nature of interaction between Dispersed Phase and Dispersion Medium.	07
Q.3	(a) Define: Vapor Pressure in close and open system	03
	(b) Determine the equilibrium pH of a solution made by adding acetic acid to water to give a concentration of 10^{-2} M at 25°C.	04
	(c) Define : Seeding. Explain the significance of seeding in BOD test.	07
	OR	
Q.3	(a) Explain the Tyndall effect in detail.	03
	(b) Define Osmotic Pressure and it's correlation with Rault's law.	04
	(c) Explain the environmental significance of (a) sulphates and (b) Nitrogen.	07
Q.4	(a) Derive the Normality of Sodium Thiosulphate solution for DO test.	03
	(b) Define with suitable examples:	04
	(i) Primary alcohol	
	(ii) Secondary alcohol	
	(iii) tertiary alcohol.	
	(c) Derive the Principle of Solvent Extraction.	07
	OR	
Q.4	(a) A sample of wastewater was incubated for 7 days at 20 °C and showed a BOD of 208 mg/L. (Assume $k' = 0.35/\text{day}$). Calculate it's 5-day, 10-day and ultimate BOD.	03
	(b) Write a short note on Biodegradation of Organic compounds.	04
	(c) Describe the Winkler method with reaction chemistry.	07

- Q.5** (a) Concentration of Glucose in water sample is 35 mg/L. Estimate the oxygen equivalent concentration of this organic matter. **03**
- (b) The solubility of PbBr_2 is 0.012 M at 25°C. Calculate the Solubility Product i.e. K_{sp} for PbBr_2 . **04**
- (c) Give the difference between: **07**
- Aliphatic and Aromatic compounds
 - Organic and Inorganic compounds
 - Fat and Wax.

OR

- Q.5** (a) Enlist the applications of Oxidation Reduction Potential (ORP). **03**
- (b) Explain the biological properties of Pesticides. **04**
- (c) Describe the classification of Adsorption in detail. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(NEW) EXAMINATION – WINTER 2022****Subject Code:3141309****Date:14-12-2022****Subject Name:Fundamentals of Wastewater Quality****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Write a short note on “complex ions.” | 03 |
| | (b) State and explain Le Chatelier’s principle in brief. | 04 |
| | (c) Explain in detail: Biological degradation of Detergents | 07 |
| Q.2 | (a) Define Heterocyclic compound and give 3 examples of it. | 03 |
| | (b) Define the following terms (i) Catalysis (ii) adsorption (iii) osmosis (iv) dialysis | 04 |
| | (c) Explain the principle of Solvent Extraction. | 07 |
| | OR | |
| | (c) Write a short note on Binary Mixture. | 07 |
| Q.3 | (a) Define the following terms (i) Enzymes (ii) Cofactors (iii) Mineralization | 03 |
| | (b) Write a short note on “Biochemistry of proteins.” | 04 |
| | (c) Differentiate between the aliphatic and aromatic compound. | 07 |
| | OR | |
| Q.3 | (a) Define the following terms (i) Smoke (ii) Foams (iii) Fog | 03 |
| | (b) List down the properties of organic compounds. | 04 |
| | (c) State and explain general properties of colloids. | 07 |
| Q.4 | (a) State the role of following chemical in the determination of DO. (i) NaN_3 (ii) $\text{Na}_2\text{S}_2\text{O}_3$ (iii) MnSO_4 | 03 |
| | (b) State the difference between COD and BOD. | 04 |
| | (c) Explain open reflux method for measurement of COD. | 07 |
| | OR | |
| Q.4 | (a) Enlist the various analytical methods used to determine the sulfate concentration. | 03 |
| | (b) State the significance of a high sulfate concentration in water supply system and in wastewater disposal. | 04 |
| | (c) Explain dilution method to determine BOD of wastewater. | 07 |
| Q.5 | (a) Enlist 4 industries that contribute oil and grease content in wastewater. | 03 |
| | (b) Explain the “Smothering” action when wastewater contain high amount of grease. | 04 |
| | (c) Explain the analytical procedure used to determine oil and grease content in wastewater. | 07 |
| | OR | |
| Q.5 | (a) Enlist the applications of volatile acid data. | 03 |
| | (b) Define volatile acid. Enlist the methods used to determine volatile acids and explain any one in brief. | 04 |

- (c) Enlist and explain environmental significance of nitrogen spices in detail. **07**
