Hall Ticket No. 　 　 　 　 　 　 　 　 　 　 　 Question Paper Code: ACE526

# INSTITUTE OF AERONAUTICAL ENGINEERING
### (Autonomous)
**Dundigal, Hyderabad - 500 043**

MODEL QUESTION PAPER-II

B.Tech VI Semester End Examinations (Regular), May   – 2020
Regulations: IARE-R16

**INDUSTRIAL WASTE WATER TREATMENT**
(**Civil Engineering**)

Time: 3 hours                                                                         Max. Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

## UNIT-I

1. (a) State the various types of benefits of water pollution control by doing treatment of industrial waste.　**[7M]**

   (b) Define Industrial waste water and explain how it is different from Domestic sewage.　**[7M]**

2. (a) Discuss in detail about the Biological properties of Industrial wastewater.　**[7M]**

   (b) Explain briefly the methods of removal of suspended solids from Industrial wastewater.　**[7M]**

## UNIT-II

3. (a) What is volume reduction? List and explain any four methods of the volume reduction in industrial wastewater?　**[7M]**

   (b) Explain the process of Oil Separation by floatation method.　**[7M]**

4. (a) Differentiate the equalization and neutralization of industrial waste water.　**[7M]**

   (b) What is the necessity of Neutralization in Industrial waste treatment? Explain the working of the same with suitable examples.　**[7M]**

## UNIT-III

5. (a) Explain Membrane  separation technologies in Phosphorous removal and write different types of  Membrane filtration?　**[7M]**

   (b) Write a short notes on disposal of industrial wastewater after the treatment.　**[7M]**

6. (a) Explain briefly the process of removal of phosphorous in industrial waste water treatment.　**[7M]**

   (b) Discuss any two special treatment methods for treating industrial waste water.　**[7M]**

## UNIT - IV

7   (a)  Characterize the various treatment processes for food and beverage industry waste water. What are the prospects of waste utilization from food industry? **[7M]**

    (b)  Describe in detail the methods for controlling the pollution from food and beverage Industries. **[7M]**

8   (a)  Discuss the characteristics of petrochemical Industrial wastewater. **[7M]**

    (b)  Explain in detail about the impacts of petroleum exploration and its production on the environment. **[7M]**

## UNIT – V

9   (a)  Explain the advantaged and limitations of combined treatment of industrial waste and municipal waste water. **[7M]**

    (b)  What are the advantages of combined treatment of industrial waste water with domestic waste water? **[7M]**

10  (a)  Explain the design procedure of Common Effluent Treatment Plants (CEPT). **[7M]**

    (b)  What are the advantages of combined treatment of industrial waste water with domestic wastewater? **[7M]**

**COURSE OBJECTIVES:**

**The course should enable the students to:**

| I | Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation |
|------|---|
| II | Understand the industrial process, water utilization and waste water generation |
| III | Acquire the knowledge on operational problems of common effluent treatment plants. |
| IV | Impart knowledge on selection of treatment methods for industrial wastewater |

**COURSELEARNING OUTCOMES:**

**Students, who complete the course, will have demonstrated the ability to do the following:**

| ACE526.01 | Know the Sources of pollution like Nonpoint sources, including storm water runoff. |
|------|---|
| ACE526.02 | Understand the Physical, chemical, organic and biological properties of industrial wastes. |
| ACE526.03 | Define the Characteristics and composition of waste water. |
| ACE526.04 | Effects of industrial effluents on sewers and natural water bodies. |
| ACE526.05 | Understand the Pre and primary treatment methods of wastewater. |
| ACE526.06 | Know the detailed procedure of Equalization of wastewater sample. |
| ACE526.07 | Perform the 'Proportioning' of the influent for treatment. |
| ACE526.08 | Carry out the 'Neutralization' of the sample to change the $P^H$ of the waste sample to value 7.0. |
| ACE526.09 | Know the various methods for 'Oil separation by floatation' while wastewater treatment process. |
| ACE526.10 | Know the alternative production strategies in industries to reduce wastewater. |
| ACE526.11 | Minimize the effects of Industrial Wastes on receiving Streams and Treatment Plants is to reduce the Volume of such Wastes |
| ACE526.12 | Reduce the strength of wastes by Process Changes, Equipment Modifications, Segregation of Wastes |
| ACE526.13 | Know the available various wastewater treatment methods. |
| ACE526.14 | Understand the detailed concept of Nitrification and De-nitrification. |
| ACE526.15 | Remove the Phosphorous from the influent in treatment plant. |
| ACE526.16 | Remove the Heavy metals, special treatment methods. |
| ACE526.17 | Know Membrane separation processes that include MicroFiltration (MF), UltraFiltration (UF), NanoFiltration (NF), ReverseOsmosis (RO), Dialysis, and Electrodialysis |
| ACE526.18 | Remove volatile compounds by Air stripping and absorption processes. |
| ACE526.19 | Know the existing methods for Disposal of treated waste water. |
| ACE526.20 | Know the manufacturing processes of industries like food processing, sugar, steel, petroleum refineries. |
| ACE526.21 | Characterize the composition of industries like textiles, tanneries, atomic energy plants and other mineral processing industries. |
| ACE526.22 | Have knowledge on joint treatment of raw industrial wastewater and domestic sewage |
| ACE526.23 | Understand the Common effluent treatment plants location, design, and operation and maintenance problems. |

## Mapping of Semester End Examination to Course Learning Outcomes

| SEE Question No | | | Course Learning Outcomes | Course Outcomes | Blooms Taxonomy Level |
|---|---|---|---|---|---|
| 1 | a | ACE526.01 | Know the Sources of pollution like Nonpoint sources, including storm water runoff. | CO 1 | Remember |
| | b | ACE526.04 | Effects of industrial effluents on sewers and natural water bodies. | CO 1 | Understand |
| 2 | a | ACE526.02 | Define the Characteristics and composition of waste water. | CO 1 | Remember |
| | b | ACE526.04 | Understand the Pre and primary treatment methods of wastewater | CO 1 | Understand |
| 3 | a | ACE526.05 | Understand the Pre and primary treatment methods of wastewater. | CO 2 | Remember |
| | b | ACE526.06 | Know the detailed procedure of Equalization of Wastewater sample | CO 2 | Remember |
| 4 | a | ACE526.08 | Reduce the strength of wastes by Process Changes, Equipment | CO 2 | Understand |
| | b | ACE526.10 | Explain the 'Neutralization' process of the sample to change the $P^H$ of the wastewater. | CO 2 | Understand |
| 5 | a | ACE526.11 | Remove the Heavy metals, special treatment methods | CO 3 | Remember |
| | b | ACE526.13 | Know the alternative production strategies in industries to reduce waste water | CO3 | Remember |
| 6 | a | ACE526.14 | Know the various methods for 'Oil separation by floatation' while wastewater treatment process. | CO 3 | Understand |
| | b | ACE526.15 | Understand the detailed concept of Nitrification and De-nitrification | CO 3 | Understand |
| 7 | a | ACE526.16 | Know the manufacturing processes of industries like food processing, sugar, steel, petroleum refineries. | CO 4 | Remember |
| | b | ACE526.18 | Know the manufacturing processes of industries like food processing, sugar, steel, petroleum refineries. | CO 4 | Remember |
| 8 | a | ACE526.18 | Know the manufacturing processes of industries like food processing, sugar, steel, petroleum refineries. | CO 4 | Understand |
| | b | ACE526.19 | Know the manufacturing processes of industries like food processing, sugar, steel, petroleum refineries. | CO 4 | Remember |
| 9 | a | ACE526.20 | Characterize the composition of industries like textiles, tanneries, atomic energy plants and other mineral processing industries | CO 5 | Remember |
| | b | ACE526.21 | Characterize the composition of industries like textiles, tanneries, atomic energy plants and other mineral processing industries | CO 5 | Remember |
| 10 | a | ACE526.22 | Have knowledge on joint treatment of raw industrial wastewater and domestic sewage. | CO 5 | Understand |
| | b | ACE526.23 | Understand the Common effluent treatment plants location, design, and operation and maintenance problems | CO 5 | Understand |

**Signature of Co-ordinator**                                                    **HOD, CE**