

# JK LAKSHMIPAT UNIVERSITY, JAIPUR

## INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, Nov.-Dec. 2017  
B. Tech in Mechanical Engineering, Semester VII

Roll No.....

ME 725: Industrial Pollution Control

Time: 3 hours

Max. Marks: 100

### Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

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|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Q.1A  | Objective type multiple choice questions (10 questions @ 1 mark)                                                                                                                                                                                                                   | 10 |
| i.    | Which gas exists in the highest concentration in the Earth's atmosphere?<br>A) carbon dioxide B) ozone C) oxygen D) nitrogen                                                                                                                                                       |    |
| ii.   | Sulfur dioxide, carbon monoxide, and particulates are all examples of primary air pollutants.<br>A) True B) False                                                                                                                                                                  |    |
| iii.  | Which of the following is true about carbon monoxide?<br>A) single largest source is from internal combustion engines<br>B) results from the actions of ultraviolet light on ozone<br>C) causes acid rain D) leading cause of cancer in smokers                                    |    |
| iv.   | Which of the following is true about sulfur dioxide?<br>A) can create smog<br>B) can create sulfuric acid, especially in the presence of particulates<br>C) released through the combustion of sulfur containing fossil fuels<br>D) all of the above are true about sulfur dioxide |    |
| v.    | Photochemical smog results from the mixing of ultraviolet light and carbon dioxide in the atmosphere.<br>A. A) True B) False                                                                                                                                                       |    |
| vi.   | Tanks that supply water to towns are built at<br>A) roofs of buildings B) tall water towers C) town level D) high lands                                                                                                                                                            |    |
| vii.  | Addition of small doses of chlorine gas into filtered water is known as<br>A) Coagulation B) Sedimentation C) Filtration D) Chlorination                                                                                                                                           |    |
| viii. | Water is passed through filter beds of sand and gravel to remove smaller particles of dust, it is called<br>A) Coagulation B) Sedimentation C) Filtration D) Chlorination                                                                                                          |    |
| ix.   | Huge strainers are used to<br>A) force water to the treatment plant B) increase the water pressure<br>C) filter large particles in the water D) filter bacteria and other harmful organisms                                                                                        |    |
| x.    | Which major step in wastewater treatment prepares the wastewater for treatment by physically removing the majority of solid material?<br>A) Primary treatment B) Secondary treatment<br>C) Tertiary treatment D) All of the above                                                  |    |
| Q.2   | Short answer type questions (4 questions @ 2.5 marks)                                                                                                                                                                                                                              | 10 |
| i.    | Define water pollution.                                                                                                                                                                                                                                                            |    |
| ii.   | What do you understand by surface water?                                                                                                                                                                                                                                           |    |
| iii.  | List any three anthropogenic sources of water pollution?                                                                                                                                                                                                                           |    |
| iv.   | List the parameters indicating water pollution.                                                                                                                                                                                                                                    |    |

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| Q.3A | Explain the causes and effects of eutrophication of a water body.                                                                                                                                                                                                                                                                                                                                                                                            | 05 |
| Q.3B | What are the different sources of ocean water pollution?                                                                                                                                                                                                                                                                                                                                                                                                     | 05 |
| Q.4A | Explain the difference between point source and non-point source water pollution with the help of suitable examples.                                                                                                                                                                                                                                                                                                                                         | 05 |
| Q.4B | Explain various sources of pollution of ground water.                                                                                                                                                                                                                                                                                                                                                                                                        | 05 |
| OR   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| Q.4B | Explain various sources of pollution of surface water.                                                                                                                                                                                                                                                                                                                                                                                                       | 05 |
| Q.5A | Describe different types of membrane filtration systems according to their pore size and applications.                                                                                                                                                                                                                                                                                                                                                       | 05 |
| Q.5B | Why environmental considerations are necessary for the sustainability of manufacturing industries?                                                                                                                                                                                                                                                                                                                                                           | 05 |
| Q.6A | What is photochemical smog? How it is formed; explain with the help of chemical reactions.                                                                                                                                                                                                                                                                                                                                                                   | 05 |
| Q.6B | The mean concentration of Sulphur dioxide in Mumbai is $47 \mu\text{g}/\text{m}^3$ . What is the equivalent concentration in parts per million at $25^\circ\text{C}$ and 1 atmosphere pressure?                                                                                                                                                                                                                                                              | 05 |
| OR   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| Q.6B | What is bio-diversity? Explain the importance of biodiversity.                                                                                                                                                                                                                                                                                                                                                                                               | 05 |
| Q.7A | For a high volume filtration set up test run for 24 hours, the following data are given:<br>Air flow through clean filter = $1.7 \text{ m}^3/\text{min}$<br>Air flow through the filter at the end of the test = $1.4 \text{ m}^3/\text{min}$<br>Average air flow = $1.55 \text{ m}^3/\text{min}$<br>Weight of the clean filter = 5 g<br>Weight of the filter after the exposure = 5.348 gm<br>Calculate the suspended particulate concentration in the air. | 05 |
| Q.7B | What is desulphurization of the flue gas and how is it carried out? Explain with the help of necessary chemical reactions.                                                                                                                                                                                                                                                                                                                                   | 05 |
| OR   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| Q.7B | What are different methods of particulate sampling? Explain with the help of appropriate diagrams.                                                                                                                                                                                                                                                                                                                                                           | 05 |
| Q.8A | Explain the application and the working principle of the flame ionization detector.                                                                                                                                                                                                                                                                                                                                                                          | 10 |
| Q.9A | Describe the principle of carbon monoxide measurement with the help of non-dispersive infrared analyzer with the help of appropriate diagram and chemical reactions.                                                                                                                                                                                                                                                                                         | 10 |
| Q.9B | What is the biomedical waste? What are different ways to safely dispose different types of biomedical wastes?                                                                                                                                                                                                                                                                                                                                                | 10 |
| OR   |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| Q.9B | What are different sources of nuclear waste? Mention different ways to manage and dispose the nuclear waste.                                                                                                                                                                                                                                                                                                                                                 | 10 |