

06CE6024

EXAM SLOT: B

Reg. No _____

Name _____

A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY

M.TECH DEGREE EXAMINATION, MAY 2016

SECOND SEMESTER

Branch: Civil Engineering

Air Pollution Control Engineering

Time: 3 Hours

Max. Marks: 60

PART A

Answer ALL questions

1. Explain Photochemical Smog?
2. Describe the mechanism of wet scrubbers?
3. Explain Alkalized Alumina process?
4. What are the non- technical measures to control vehicular pollution in India?
(4 x 5 marks =20 marks)

PART B

5. Explain the classification of air pollutants? (10 marks)
- OR
6. Describe criteria air pollutants? (10 marks)
7. Explain Electrostatic precipitators? Derive an equation for its collection efficiency?
(10 marks)
- OR
8. Explain different particle collection mechanisms?
(10 marks)
 9. Explain different methods for the control of nitrogen oxides?
(10 marks)
- OR
10. Explain different wet scrubbing methods for the desulphurization of flue gases?
(10 marks)
 11. Explain common indoor air contaminants?
(10 marks)
- OR
12. Describe the mechanism of bio-filters?
(10 marks)
- (4 x 10 marks =40 marks)

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A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY

M.TECH DEGREE EXAMINATION, APRIL/MAY 2017

SECOND SEMESTER

Branch: Civil Engineering

Air Pollution Control Engineering

Time: 3 Hours

Max. Marks: 60

PART A

Answer ALL questions

1. Explain the effect of air pollution on vegetation?
2. Write a note on inertial impaction?
3. Explain Alkalized –Alumina process?
4. Explain the factors affecting indoor air quality?

(4 x 5 marks =20 marks)

PART B

5. Explain the classification and properties of air pollutants? (10 marks)

OR

6. Explain photochemical smog? (10 marks)

7. Derive an expression for the collection efficiency of an electrostatic precipitator? (10 marks)

OR

8. Explain the mechanism of wet scrubbers? (10 marks)

9. Explain dry methods for the desulphurization of flue gases? (10 marks)

OR

10. Explain different methods for the control of nitrogen oxides? (10 marks)

11. Explain different technical measures for the control of vehicular pollution in India? (10 marks)

OR

12. Explain different methods to improve indoor air quality? (10 marks)

(4 x 10 marks =40 marks)

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A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY
M.TECH DEGREE EXAMINATION, APRIL/MAY 2018
SECOND SEMESTER
ENVIRONMENTAL ENGINEERING
AIR POLLUTION CONTROL ENGINEERING

Time: 3 Hrs

Maximum Marks:60

PART A

Answer ALL Questions

1. From which natural sources might the following pollutants arise: Hydrocarbons, carbon monoxide, methane, hydrogen sulfide and particulate matter.
2. What are the generalized techniques employed for controlling/reducing the concentration of air pollutants in the atmosphere?
3. Differentiate between isokinetic and non-isokinetic sampling.
4. What are the advantages and disadvantages of biofilters?

4 x 5 marks = 20 marks

PART B

5. (a) Explain the relationship between ambient and adiabatic lapse rate and atmospheric stability. Discuss with the help of a diagram. [5 marks]
- (b) During rush hour on a busy road crossing, nearly 1200 vehicles ply per hour at an average speed of 24 kmph. Of these 70 % of cars use leaded petrol. The average fuel consumption is 1 L for an average of 8 km of travel. Considering that 65 % of the lead present in the fuel is emitted in the form of particulate aerosol, find the emission rate of lead aerosol in the ambient air. (Given concentration of lead in the fuel is 0.4 $\mu\text{g/L}$) [5 marks]

OR

6. (a) Explain negative lapse rate and temperature inversion conditions. How does inversion conditions affect the pollution levels of the immediate environment of humans. [5 marks]

(b) Write short note on air pollution laws and standards in India. [5 marks]

7. (a) What specific air pollution control devices are available for control of particulate emissions at their source? Indicate the size range of particulate that each type of unit is capable of removing efficiently. [5 marks]

(b) Determine the filter cloth area to process a flow of $8.8 \text{ m}^3/\text{s}$ of gas at the filtering velocity of $1.5 \text{ m}/\text{min}$. The diameter of the bags used in the system is 20 cm and length is 5 m . How many bags will be required for continuous cleaning? [5 marks]

OR

8. (a) With the help of a neat sketch explain the working of a cyclone separator. [5 marks]

(b) An electrostatic precipitator is to be constructed to remove fly-ash particles from stack gas flowing at $100 \text{ m}^3/\text{s}$. For a given plate area of 30 m^2 the overall collection efficiency was found to be 97% . If the plate area is increased to 40 m^2 , estimate the anticipated efficiency. [5 marks]

9. (a) With the help of a schematic diagram explain single and double alkali scrubbing. [6 marks]

(b) Write short note on flue-gas control methods for nitrogen oxides. [4 marks]

OR

10. What are the different methods available to control air pollution by process changes? Illustrate with examples. [10 marks]

11. (a) Explain briefly the basic strategies to reduce air pollutant concentration in the indoor air. [5 marks]

(b) Suggest suitable methods of minimizing crank-case emissions and evaporative emissions. [5 marks]

OR

12. (a) Write short note on Indoor air quality standards. [5 marks]

- (b) What are the major air pollutants present in automobile exhaust? How can it be controlled? [5 marks]

4 x 10 marks = 40 marks

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A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY
M.TECH DEGREE EXAMINATION, MAY/JUNE 2019
SECOND SEMESTER
ENVIRONMENTAL ENGINEERING
AIR POLLUTION CONTROL ENGINEERING

Time: 3 Hrs

Maximum Marks:60

PART A

Answer ALL Questions

1. With the help of a flow chart explain the sources of air pollutants.
2. Discuss the mechanism of filtration of particles.
3. Explain desulphurization.
4. Briefly explain Bharat Stage Emission Standards.

4 x 5 marks = 20 marks

PART B

5. a. A SO₂ concentration is given as 830mg/m³ at 25°C and 1 atm. Express this concentration in parts per million (ppm).
[5 marks]
- b. Explain the properties, sources and effects of Lead.
[5 marks]

OR

6. Discuss the favourable conditions, formation mechanisms and effects of photo chemical smog
[10 marks]
7. Explain the principle of electrostatic precipitator. Discuss the advantages and limitations of electrostatic precipitators.
[10 marks]

OR

8. The exhaust rate of the gas being processed is given as $3000 \text{ m}^3 / \text{min}$. The inlet dust concentration in the gas as it enters the ESP is 250 gm/m^3 . If the emission regulations state that the outlet dust concentration must be less than 2 gm/m^3 , how much collection area is required to meet the regulations ? Use the Deutsch-Anderson equation for this calculation and assume the migration velocity is 0.1 m/sec .

[10 marks]

9. a. List out the major sources of oxides of Nitrogen. What are the three basic parameters that must be controlled in order to control the quantity of NO emitted from combustion process.

[5 marks]

- b. Write short note on instrumental methods available for monitoring of carbon monoxide and hydro carbons.

[5 marks]

OR

10. a. What are the possible removal techniques for controlling the emission of oxides of nitrogen?

[5 marks]

- b. If coal burning power plants were required to use sulphur recovery process, which method of controlling SO_2 emissions would you suggest. Explain.

[5 marks]

11. List out and explain the indoor air pollutants produced from man-made source

[10 marks]

OR

12. Explain the various types of air cleaning technologies

[10 marks]

4 x 10 marks = 40 marks