

Code No: 07A70108

R07**Set No. 2**

IV B.Tech I Semester Examinations, December 2011
AIR POLLUTION AND CONTROL
Civil Engineering

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. List the various procedures for controlling the emission of NO_x. Explain, how do you reduce the emissions of NO_x by:
 - (a) Non Selective catalytic reduction.
 - (b) Electron beam irradiation. [16]
2. (a) Define air quality standards. How do you express the emission?
 (b) Explain any three methods for determining Air Pollution index. [6+10]
3. (a) Discuss composition of Natural Gas.
 (b) Discuss origin and properties of Natural gas. [10+6]
4. (a) Discuss the phenomenon of ozone layer depletion.
 (b) Describe the history of green house effects. [8+8]
5. (a) What are the applications of electro static precipitators in various industries?
 (b) A cylindrical electrostatic precipitator of diameter 0.3m is used for separating pulverized coal flyash particles from a furnace gas stream. If the volumetric flow rate of the gas is 0.05 m³/sec, what will be the length of precipitator for obtaining a collection efficiency of 99.9%. What percent change in electrode collection area is required to increase the collection efficiency from 99.9 to 99.95%? [8+8]
6. A thermal power burns 5.45 tonnes with 4.2% sulphur per hour and discharges through a stack of 75m effective height, average wind speed at top of stack is 6m/s. with moderate stable atmosphere, calculate max. GLC and the corresponding distance. [16]
7. (a) Explain any two major Air-Pollution disasters. How did these disasters challenge the environmentalists?
 (b) Explain the term Green House Effect and the causes. Describe the global scenario of the same. [9+7]
8. (a) Discuss the sources of Asbestos and Barium air pollutants.
 (b) How domestic combustion of fuel contributes to the air pollution?
 (c) Differentiate between the automobiles using petrol and diesel fuels from air pollutants generation point of view. [4+6+6]

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R07**Set No. 4**

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Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
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1. (a) Explain the effect of water bodies, ridges, valleys, terrain roughness on pollutant dispersion.
 (b) Write a short notes on air pollution modelling. [10+6]
2. What are the various dry methods of control of SO_x? Explain how do you control SO_x by the following processes:
 (a) SCOT Process
 (b) Use of Metal oxides. [16]
3. (a) Most of the three wheelers of para transit transport (Auto-Rickshaws) are converted to CNG engines. Give your comments from air pollution point of view.
 (b) Enlist the specific air pollutants. Explain the effects on human health of the same.
 (c) Discuss the visibility impairment and the economic losses due to air pollution. [7+5+4]
4. (a) Write short notes on Emission standards for mobile sources.
 (b) Write a short notes on:
 - i. Rating scales for indices
 - ii. Dissemination techniques for air pollution indices
 - iii. Index monitoring guidelines. [4+12]
5. (a) Describe the scenario of air pollutants generated in automobiles and Industrial processes.
 (b) India's one of the most widely used fossil fuels is coal. How does it affect our environment from air pollution point of view.
 (c) Discuss the properties of oxides of sulphur with reference to air pollution. [6+7+3]
6. (a) Describe the effects of ozone holes on flora and fauna.
 (b) Explain briefly the history of Ozone holes. [9+7]
7. (a) Explain the phenomenon of 'Front', in case of air mixing. How does it affect the air pollutants' dispersion?
 (b) Explain the following terms:

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- i. Fumigation
 - ii. Trapping
 - iii. Lofting. [10+6]
8. (a) What is the minimum size of the particulates removed through the following control equipments:
- i. Settling chambers
 - ii. Cyclones
 - iii. Fabric filters
 - iv. ESP's
- (b) Design a parallel type electrostatic precipitator with 10 channels to handle 10,000 m³hr of gas for efficiency of 99%. [6+10]

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R07**Set No. 1**

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All Questions carry equal marks

1. (a) Explain the cyclonic spray scrubber with a neat sketch.
 (b) Design a tubular ESP to treat $10,000 \text{ m}^3/\text{hr}$ of a gaseous stream from a paper mill for an efficiency of 99%. Assume an effective migration velocity of 0.075 m/sec . [8+8]
2. (a) Define Air pollution according to Bureau of Indian Standards, IS -4167 (1966). Explain the terms Gas, Fog, Aerosol and Particulate.
 (b) Differentiate between Primary and Secondary air pollutants. Explain the formation of Ozone in the atmosphere as a secondary pollutant. [9+7]
3. (a) Discuss the effects of particulates on human health in particular.
 (b) Describe the effects of air pollution on Taj Mahal. [9+7]
4. Explain, how do you control the emission of SO_x by the following process:
 - (a) c_{uO} / c_{uSO_4} process
 - (b) ASARCO Process
 - (c) COMINO Process.
 - (d) Citric acid scrubbing. [16]
5. (a) Write a short notes on:
 - i. The Air Prevention and Control of Pollution Act
 - ii. The Environment (Protection) Act.
 (b) What are the long-term goals recommended by WHO for the following pollutants?
 - i. SO_2
 - ii. Suspended Particles
 - iii. CO
 - iv. Photochemical oxidant. [8+8]
6. (a) Why do we see different dispersion patterns during night and day time in a valley?
 (b) How does urban zoning help in reducing the effects of air pollution? [9+7]
7. (a) Explain the effect of air pollutants on meteorology.
 (b) Explain the Gaussian plume model. [8+8]

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8. (a) Discuss the effects of particulates on earth - atmosphere heat balance.
(b) What do you mean by black snow? How is it is formed? [6+10]

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R07**Set No. 3**

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1. (a) Explain the phenomenon of wind belts.
 (b) What is wind rose diagram? Give general classification of the same. [8+8]
2. (a) Differentiate between stationary and mobile sources of air pollution. Discuss the effects of Photochemical Smog on human beings and environment as well.
 (b) Discuss the scope and effects of Natural pollutants. [7+9]
3. (a) Explain the procedure for stack monitoring in detail.
 (b) Write short notes on Ambient Air quality monitoring. [10+6]
4. (a) What is thermodynamics? Why it is relevant in the study of air pollution.
 (b) Discuss the cause of CO production. [8+8]
5. (a) Discuss the effects of special pollutants like ammonia and Arsenic on Human health.
 (b) How lead and mercury pollutants are causing damage to the human body?
 (c) Discuss the effects of carbon monoxide on health. What are the remedial measures for the same. [6+5+5]
6. (a) List the various procedures for controlling the emission of NO_x and SO_x.
 (b) Discuss the air pollution problems in a cement industry. Suggest suitable methods of control. [6+10]
7. A thermal power plant burns 100 tonnes of coal with 5.5% sulphur content. Calculate the minimum stack height required. The particulate concentration in flue gases is 8000mg/m³ and the gas flow rate is 20m³/sec. [16]
8. (a) Discuss the various factors to be considered while selecting a suitable control equipment for particulate removal.
 (b) Design a parallel type electrostatic precipitator with 10 channels to handle 10,000 m³/hr of gas for efficiency of 99%. [8+8]
