Code No: 07A70108 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,NOVEMBER 2010
AIR POLLUTION AND CONTROL
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the Advantages and Disadvantages of electro static precipitators?
   (b) Design a tubular ESP to treat 10,000 m^3/hr of a gaseous stream from a paper mill for an efficiency of 90%. Assume an effective migration velocity of 0.075 m/sec. [8+8]
2. (a) Explain the phenomenon of wind belts.
   (b) What is wind rose diagram? Give general classification of the same. [8+8]
3. (a) Define Air Pollution Index. What are the parameters generally used for calculating Air Pollution Index?
   (b) What are the environmental guide lines for citing of industries to ensure optimum use of natural and man-made resources in sustainable manner? [8+8]
4. (a) Discuss the role played by vegetation in controlling Air Pollution.
   (b) Explain the effects of water bodies on air pollution dispersion.
   (c) Discuss the air pollutant dispersion in developed urban area with tall buildings and rural area with special reference to wind obstruction and moisture. [5+6+5]
5. Explain how do you control the emission of NOx by the following treatment methods:
   (a) Absorption by Alkaline solutions.
   (b) Absorption by Lime.
   (c) Adsorption by Solids. [16]
6. (a) Explain the thermodynamics of formation of Oxides of Nitrogen.
   (b) Explain the role of Sulphur dioxide as a reducing and oxidizing agent. [8+8]
7. (a) Discuss anthropogenic sources of lead,mercury and iron as air pollutants.
   (b) Describe the natural and artificial sources for the production of oxides of Nitrogen.
   (c) What is primary particulate production in artificial sources of air pollution? [7+6+3]
8. (a) Explain the effect of air pollutants on meteorology.
   (b) Explain the Gaussion plume model. [8+8]

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Code No: 07A70108 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,NOVEMBER 2010
AIR POLLUTION AND CONTROL
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. What are the various dry methods of control of SOx? Explain how do you control SOx by the following processes:
   (a) Cat Ox
   (b) Process use of metal oxides. [16]
2. (a) What do you mean by Wind Rose diagram? Explain the same with a typical diagram.
   (b) What is lapse rate? Discuss its relation with temperature variation. [10+6]
3. (a) What are the merits and demerits of scrubbers?
   (b) Design a gravity settler to remove all the iron particulates from a dust-laden gas stream of the following data:
   d_p = 35 μm , uniform, no distribution
   gas= Air at ambient conditions
   Q = 4.6 m^3/sec
   ρ_p = 7.62 g/c.c. [6+10]
4. (a) Write a short notes on minimum stack height.
   (b) A factory uses 2,00,000 litre of furnace oil (specific gravity 0.97) per month. If for one million litre of oil used per year, the particulate matter emitted is 3 tonnes/year, SO_2 emitted is 59.7 tonnes/year, NOx emitted is 7.5 tonnes/year, Hydro carbons emitted are 0.37 tonnes/year and Carbon monoxide emitted is 0.52 tonnes/year. Calculate the height of chimney required to be provided for safe dispersion of the pollutants. [6+10]
5. (a) Discuss the phenomenon of ozone layer depletion.
   (b) Describe the history of green house effects. [8+8]
6. (a) How LPG is produced? Explain the uses and formation of air pollutants.
   (b) Discuss the role of natural gas, its availability and eco-friendly nature in India. [8+8]
7. (a) Describe major processes in petroleum refineries which generate air pollutants.
   (b) Discuss the importance of Natural sources of air pollution.
   (c) 'Anthropogenic sources of air pollution are more dangerous than natural'. Discuss. [4+5+7]

8. (a) Discuss the status of Air pollution due to automobile exhausts in:
   i. Hyderabad
   ii. Bangalore
   (b) Suggest suitable methods to control the air pollution. [8+8]

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Code No: 07A70108 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,NOVEMBER 2010
AIR POLLUTION AND CONTROL
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (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]
2. Explain with a neat sketch, the principle, construction and working of Fabric filters. What are the factors affecting the efficiency of Fabric filters? [16]
3. What are the various dry methods of control of SOx? Explain how do you control SOx by the following processes:
   (a) Cat Ox Process
   (b) SCOT Process. [16]
4. (a) Define Air Pollution Index. What are the parameters generally used for calculating Air Pollution Index?
   (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]
5. (a) Describe the effects of ozone holes on flora and fauna.
   (b) Explain briefly the history of Ozone holes. [9+7]
6. (a) Explain the role of atmospheric levels in the air pollution phenomenon.
   (b) Discuss the various scales of meteorology. [9+7]
7. (a) What is fly ash production? How does it damage the visibility in atmosphere?
   (b) In burning of oil, what care should be taken to reduce the production of Air pollutants. [10+6]
8. The traffic density along a straight national highway is 4000 vehicles per hour and average speed is 60KMPH. The average vehicle emission rate of HCS is 40 mg/sec. Find the concentration at a point 300m downwind on an overcast day if wind is blowing perpendicular to the road at 5 m/sec speed. [16]

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Code No: 07A70108 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,NOVEMBER 2010
AIR POLLUTION AND CONTROL
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (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]

2. (a) Which air pollutants do affect metals and alloys?
   (b) Discuss the terms:
      i. Global warming
      ii. Chloroflourocarbons. [6+10]

3. (a) Describe the parameters upon which the stack height is determined.
   (b) Draw and explain the effects of valley on pollutant concentration. [7+9]

4. Find the effective stack height if a 40m stack releases SPM at a rate of 1.25 grams/sec. The atmospheric pressure is 10.8m of water. The temperatures of ambient air and gas are 27 ^{0}C and 400 ^{0}C. The stack diameter is 2.3m, stack gas velocity is 6m/sec and the wind velocity is 1.8m/sec. Also find the ground level concentrations at 1 km, 2km, 5 km and 10 km distances in the direction of wind. Note : [16]

X(km)	1	2	5	10
σ_y	4	133	300	510
σ_z	30	50	95	150

5. (a) Distinguish between:
      i. Single Stage and Two stage precipitators
      ii. Pipe-type and Plate-type precipitators.
   (b) Design a parallel type electrostatic precipitator with 10 channels to handle 10,000 m^3/hr of gas for efficiency of 95%. [8+8]

6. (a) Define Air Pollution Index. What are the parameters generally used for calculating Air Pollution Index?
   (b) Give the Indian Air Quality Standards (SPM, SO_2, NOx, CO) for Residential, Industrial and Sensitive areas. [8+8]

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7. (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]

8. (a) Explain SO_x control by chemico process using MgO.
   (b) Explain CATOX process of removal SO_x. [8+8]

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