B.E. (Civil Engineering) Seventh Semester (C.B.S.)

# Elective-I : Air Pollution & Solid Waste Management

P. Pages : 2 **NIR/KW/18/3520**

Time : Three Hours * 1 9 0 5 * Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Illustrate your answers whenever necessary with the help of neat sketches.

**1.** a) Define air pollution. Describe different air pollution episodes mentioning type of pollutant and meteorological condition responsible? **6**

b) Give classification of air pollutants mentioning the source of their generation. **7**

**OR**

**2.** a) Discuss air quality standards for different pollutants. **6**

b) Discuss the impact of air pollution on plants and properties. **7**

**3.** a) What is lapse rate? Explain its types and its impact on air pollution. **6**

b) Compare any two equations to calculate effective stack height for the following data:- **7**
i) Wind velocity = 3m/s
ii) Air temperature - 21ºC
iii) Barometric pressure = 1000 millibars
iv) Stack gas velocity = 12 m/s
v) Stack gas temperature = 175ºC
vi) Physical stack height is 180m and 0.95m as stack inner diameter.

**OR**

**4.** a) Discuss the methods of ambient air sampling. **6**

b) Write a note on stack gas sampling. **7**

**5.** a) With a sketch explain working of electrostatic precipitation. **7**

b) Discuss the terms (a) Adsorption (b) Condensation in reference to air pollution control. **7**

**OR**

| | | | |
|---|---|---|---|
| **6.** | a) | Write a note on control of automobile exhaust emission. | **7** |
| | b) | What are the sources, standards for noise? Explain methods to control noise pollution. | **7** |
| **7.** | a) | Explain functional elements of solid waste management system with flow sheet. | **6** |
| | b) | What is per capita generation of solid waste? Explain measures to estimate per capita generation. | **7** |

**OR**

| | | | |
|---|---|---|---|
| **8.** | a) | What are physical & chemical characteristics of solid waste. | **6** |
| | b) | Classify the different sources of solid wastes. | **7** |
| **9.** | a) | What are different methods for house to house collection of solid waste. | **6** |
| | b) | Write a note on route optimization of solid waste. | **7** |

**OR**

| | | | |
|---|---|---|---|
| **10.** | a) | Discuss methods of processing solid wastes. | **6** |
| | b) | Explain 3R concept in solid waste management. | **7** |
| **11.** | a) | What is composting? Explain Indore and Bangalore methods of composting. | **7** |
| | b) | Write a note on control of landfill gases. | **7** |

**OR**

| | | | |
|---|---|---|---|
| **12.** | a) | What is incineration? Explain types of incinerators and any one in detail with sketch. | **7** |
| | b) | Discuss methods of leachate management from landfills. | **7** |

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B.E. (Civil Engineering) Seventh Semester (C.B.S.)

# Elective - I : Air Pollution & Solid Waste Management

P. Pages : 2 **NJR/KS/18/4575**

Time : Three Hours * 0 2 3 7 * Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Diagrams and chemical equations should be given whenever necessary.

**1.** a) What are the major air pollutants and what are the effects of air pollutant on man (any two). **6**

b) Define air pollution. Give the various sources of air pollution. **7**

**OR**

**2.** a) Write short note on standards of air pollution. **6**

b) Explain Green house effects. **7**

**3.** a) Write short note on stack sampling in industry. **6**

b) A factory uses 0.3 million liters of fuel oil per month. (Specific gravity 0.96). If has been estimated that one million liters of oil used per year, the following are the quantities of pollutant observed. **7**

1) Particulate matter = 3.5 tonnes/year
2) $SO_2$ = 60.4 tonnes /year
3) NOx = 7.0 tonnes / year
4) CO = 0.50 tonnes / year.

Assuming factory works 300 days for 24 hours. Determine the safe height of chimney for the safe dispersion of pollutants.

**OR**

**4.** a) Explain procedure for collection of SPM by high volume dust sampler. **6**

b) Explain meteorological factors affecting air pollution. **7**

**5.** a) What are the principles on which gaseous control equipment works? Explain any two. **7**

b) Write short note on Automobile exhaust (Due to diesel and petrol engine). **7**

**OR**

**6** a) Explain electrostatic precipitator & Draw neat sketch. **7**

b) Explain Bag filter with working, construction & Draw neat sketch. **7**

**7.** a) What are the physical characteristics of solid waste and explain how to determine them. **6**

b) Write short note on necessity and responsibility of solid waste management. **7**

**OR**

**8.** a) Write short note on sampling of solid waste. **6**

b) What are various sources for generation of solid waste. **7**

**9.** a) What is transfer station. Explain its types. **7**

b) Write short note on Heuristic method along with guiding principles. **7**

**OR**

**10.** a) Describe various types of transportation. Vehicles used for collection and transportation of solid waste. **7**

b) Write note on **any two.** **7**

i) 3-R concept of solid waste.

ii) Optimization of transport route.

iii) Method of separation of solid waste.

**11.** a) Explain in brief various method of sanitary Landfilling. **7**

b) Define composting. Explain different types of composting. **6**

**OR**

**12.** a) Draw neat sketch of 3T diagram and state advantages & disadvantages of incineration. **6**

b) How to control leachate and gas from sanitary landfilling. **7**

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B.E. (Civil Engineering) Seventh Semester (C.B.S.)

# Elective - I : Air Pollution & Solid Waste Management

P. Pages : 2 **NRJ/KW/17/4575**

Time : Three Hours * 0 9 7 4 * Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Diagrams and chemical equations should be given whenever necessary.

**1.** a) Define air pollution. Explain various sources of an air pollution. **7**

b) What is photo chemical smog? Explain the chemistry of photo chemical smog and its effect on human health. **6**

**OR**

**2.** a) Explain the effects of air pollution on human and plants. **6**

b) Write note on **any two.** **7**

i) Ozone depletion.

ii) Primary and secondary air pollutants.

iii) Zones of atmosphere.

**3.** a) Explain meteorological factors affecting air pollution. **6**

b) Explain different types of plume behavior with neat sketches. **7**

**4.** a) Write short note on High volume sampler. **6**

b) Define wind rose. Explain its importance in air pollution studies. **7**

**5.** a) List out the controlling equipments used in industries to control particulate matter and explain bag filter. **7**

b) What are the effects of sound pollution on health and how to control it. **7**

**OR**

**6.** State the principles on which gaseous pollutants controlling equipments are used and explain the various methods used to control gaseous pollutants in industries. **14**

**7.** a) Explain the various sources of generation of solid waste. **7**

b) Explain the physical and chemical characteristics of solid waste. **6**

**OR**

**8.** a) Write down the functional elements of solid waste management. **6**

b) Write note on **any two.** **7**

i) Sampling of solid waste.

ii) Quality and quantity of solid waste.

iii) Composition of solid waste in Indian cities.

**9.** a) Explain various methods of solid waste collection with sketch. **7**

b) What is transfer station? state it's types. **6**

**OR**

**10.** a) Write short note on methods for separation of municipal solid waste (any two). **7**

b) Explain the methods of collections of solid waste from house to house. **6**

**11.** a) How to control leachate from sanitary landfill. Explain it. **7**

b) What are factors on which composting is depends explain any four. **7**

**OR**

**12.** Write short note on **any three.** **14**

i) Site selection of sanitary landfill.

ii) Types of incinerator.

iii) Three component diagram.

iv) Control of gaseous from sanitary landfill.

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B.E. Seventh Semester (Civil Engineering) (C.B.S.)

# Elective - I : Air Pollution & Solid Waste Management

P. Pages : 2 **NKT/KS/17/7436**

Time : Three Hours * 0 0 9 5 * Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

**1.** a) Define air pollution. Explain various sources of an air pollution. **7**

b) What is photo chemical smog? Explain the chemistry of photo chemical smog and its effect on human health. **6**

**2.** a) Explain the effects of air pollution on human and plants. **6**

b) Write note on **any two.** **7**

i) Ozone depletion.

ii) Primary and secondary air pollutants.

iii) Zones of atmosphere.

**3.** a) Explain meteorological factors affecting air pollution. **6**

b) Explain different types of plume behavior with neat sketches. **7**

**OR**

**4.** a) Explain procedure for collection of SPM by high volume dust sampler. **6**

b) A factory used 1.2 Million liter of oil per month. A factory works for 16 hrs. in a day. If the factory uses 1 Million liter of oil per year then following are the pollutants concentration emitted into atmosphere. **7**

i) Particulate matter = 5t/year
ii) $SO_2$ = 25t/year
iii) Oxides of nitrogen = 7t/year
iv) Hydrocarbons = 0.3t/year
v) Carbon monoxide = 0.52t/year

Determine the safe height of stack required for the safe dispersion of pollutants.

**5.** a) What are the principles on which gaseous control equipment works? Explain any two. **7**

b) Write short note on Automobile exhaust (Due to diesel and petrol engine) **7**

**OR**

**6.** a) Explain electrostatic precipitator & Draw neat sketch. **7**

b) Explain Bag filter with working, construction & Draw neat sketch. **7**

**7.** a) Explain the various sources of generation of solid waste. **7**

b) Explain the physical and chemical characteristics of solid waste. **6**

**OR**

**8.** a) Write down the functional elements of solid waste management. **6**

b) Write note on **any two.** **7**
i) Sampling of solid waste.
ii) Quality and quantity of solid waste.
iii) Composition of solid waste in Indian cities.

**9.** a) Explain various methods of solid waste collection with sketch. **7**

b) What is transfer station? state it's types. **6**

**OR**

**10.** a) Describe various types of transportation. Vehicles used for collection and transportation of solid waste. **7**

b) Write Note on **any two.** **6**
i) 3-R concept of solid waste.
ii) Optimization of transport route.
iii) Method of separation of solid waste.

**11.** a) Explain in brief various method of sanitary Landfilling. **7**

b) Define composting. Explain different types of composting. **7**

**OR**

**12.** a) Draw neat sketch of 3T diagram and state advantages & disadvantages of incineration. **7**

b) How to control leachate and gas from sanitary landfilling. **7**

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B.E. (Civil Engineering) Semester Seventh (C.B.S.)

# Elective - I : Air Pollution and Solid Waste Management

P. Pages : 2 **KNT/KW/16/7436**

Time : Three Hours * 0 8 1 1 * Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

**1.** a) Explain the effect of air pollutants any two on man. **7**

b) Define air pollution and explain any one air pollution episode. **6**

**OR**

**2.** a) Write short note on Green house effect and how to control it. **7**

b) Explain standards for air pollution as per I.S. **6**

**3.** a) Explain with neat sketch 'High volume sampler' to measure the pollution level in ambient air. **7**

b) A factory uses 300,000 liters of furnace oil (Specific gravity 0.98) per month. Factory runs 24 hours in a day and 300 days in a year. If the factory uses 1.0 mL of oil per year, then following are the pollutants emitted into the atmosphere through chimney. **7**

1) Particulate matter : 4.0 t/year.

2) $SO_2$ : 30 t/year.

3) HC : 0.37 t / year.

4) Carbon monoxide: 0.7t

Calculate the height of chimney required to be provided for a safe dispersion of pollutant.

**OR**

**4.** a) Write short note on stack sampling. **7**

b) Find the concentration of pollutant in atmosphere by using high volume sampler. **7**

1) Actual sampling time = 24 hrs or 1440 mints.

2) Sampling rate when filter is clean = 1.70 $m^3$/min.

3) Sampling rate after exposer = $1.5 m^3$/min.

4) $\left.\begin{matrix}\text{Wt. of filter paper before} \\ \text{exposer}\end{matrix}\right\} = 3.618\text{gms.}$

5) $\left.\begin{matrix}\text{Wt. of filter paper after} \\ \text{exposer}\end{matrix}\right\} = 3.965\text{gms.}$

**5.** a) State the various types of equipment used to control particulate matter and explain any one in detail. **7**

b) Explain incineration method to control the gaseous pollutants. **6**

**OR**

**6.** a) Write short note on noise pollution and its ill effect and how to control it. **7**

b) Write short note on pollution due to petrol and diesel engines. **6**

**7.** a) Write short note on classification of solid waste based on their sources and composition. **7**

b) Explain per capita solid waste production and explain the factors on which it depends. **6**

**OR**

**8.** a) How the sampling of solid waste is carried out? **7**

b) Write short note on physical and chemical characteristics of solid waste. **6**

**9.** a) Explain in detail the house to house collection of solid waste. **7**

b) Explain in detail the transfer station and its type. **6**

**OR**

**10.** a) What are the different methods used for planning of refuse vehicle route and explain Heuristic method. **7**

b) Explain treatment for Refuse Derive fuel (RDF). **6**

**11.** a) What is composting and explain the various factors on which it depend. **7**

b) Write short note on mechanical composting. **7**

**OR**

**12.** a) What are the various methods of sanitary land fill and explain each with sketch. **7**

b) Explain with sketch the recovery of methane from sanitary land fill. **7**

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B.E. (Civil Engineering) Seventh Semester (C.B.S.)

# Elective - I : Air Pollution & Solid Waste Management

P. Pages : 2 **TKN/KS/16/7523**

Time : Three Hours * 1 0 2 3 * Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data whenever necessary.
4. Diagrams and chemical equations should be given whenever necessary.
5. Illustrate your answers whenever necessary with the help of neat sketches.
6. Use of non programmable calculator is permitted.

**1.** a) What are the major air pollutants and what are the effects of air pollutant on man (any two) **6**

b) Define air pollution. Give the various sources of air pollution. **7**

**OR**

**2.** a) Write short note on standards of air pollution. **6**

b) Explain Green house effects. **7**

**3.** a) Write short note on stack sampling in industry. **6**

b) A factory uses 0.3 million liters of fuel oil per month. (Specific gravity 0.96). If has been eshmated that one million liters of oil used per year, the following are the quantities of pollutant observed. **7**

1) Particulate matter = 3.5 tonnes / year 2) $SO_2 = 60.4$ tonnes / year

3) $NO_x = 7.0$ tonnes / year 4) CO = 0.50 tonnes / year

Assuming factory works 300 days for 24 hours.

Determine the safe height of chimey for the safe dispersion of pollutants.

**OR**

**4.** a) Write short note on High volume sampler. **6**

b) Define wind rose. Explain in importance in air pollution studies. **7**

**5.** a) List out the controlling equipments used in industries to control particulate matter and explain bag filter. **7**

b) What are the $1\mu$ effects of sound pollution on health and how to control it. **7**

**OR**

**6.** State the principles on which gaseous pollutants controlling equipments are used and explain the various methods used to control gaseous pollutants in industries. **14**

**7.** a) What are the physical characteristics of solid waste and explain how to determine them. **6**

b) Write short note on necessity and responsibility of solid waste management. **7**

**OR**

**8.** a) Write short note on sampling of solid waste. **6**

b) What are various sources for generation of solid waste. **7**

**9.** a) What is transfer station. Explain its types. **7**

b) Write short note on Heuristic method along with guiding principles. **7**

**OR**

**10.** a) Write short note on methods for separation of municipal solid waste (any two) **7**

b) Explain the methods of collections of solid waste from house to house. **7**

**11.** a) How to control leachate from sanitary landfill. Explain it. **6**

b) What are factors on which composting is depends explain any four. **7**

**OR**

**12.** Write short note on **any three.** **13**

i) Site selection of sanitary landfill.

ii) Types of incinerator.

iii) Three compoent diagram.

iv) Control of gaseous from sanitary landfill.

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# Seventh Semester B. E. Civil (CBS) Examination

## AIR POLLUTION AND SOLID WASTE MANAGEMENT

## (Elective – I)

Time : Three Hours ] [ Max. Marks : 80

N. B. :
(1) All questions carry marks as indicated.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Diagrams and Chemical equations should be given wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.
(6) Use of non programmable calculator is permitted.

1. (a) Explain the effects of air pollution on human and materials. 6

(b) What are the types of sources of air pollutants ? Briefly explain them. 7

**OR**

2. (a) How does air pollution affects the different Zones of atmosphere ? 7

(b) Distinguish between :—

(1) Primary and secondary air pollutant.

(2) Stationary and mobile source air pollution. 6

3. (a) Explain the different types of plume behavior with neat sketches. 6

(b) Explain the meteorological factors influencing the air pollution. 7

**OR**

4. (a) Explain stack air sampling in industry. 6

(b) Write short note on (Any **two**) :—

(1) Wind rose diagram.

(2) Determination of stack height.

(3) High volume sampler (HVS). 7

5. (a) What are the ill effects and remedies of noise pollution ? 7

(b) What are principles on which gasous control equipments works ? Explain any two. 7

**OR**

6. (a) Write short note of electrostatic precipitator (ESP). 7

(b) Write short note on pollution due to diesel and petrol engines. 7

7. (a) Define 'solid waste'. Explain the various sources of generation of solid waste. 7

(b) Explain the physical and chemical characteristics of solid waste. (Any two each). 6

OR

8. (a) Write down the functional elements of solid waste management. 6

(b) Write notes on (any **two**) :—

(1) Sampling of solid waste.

(2) Necessity and responsibility of solid waste management.

(3) Quantity and Quality of solid waste. 7

9. (a) Explain the various methods of collection of solid waste from house-house with neat sketches. 7

(b) Explain transfer station and state it's types. 6

OR

10. (a) Describe various types of transportation vehicle used for collection and transportation of solid waste. 7

(b) Write notes on (any **two**) :—

(1) Optimization of transport route.

(2) Methods for separation of solid waste.

(3) 3–R concept of solid waste. 6

11. (a) What is 'sanitary landfilling' ? State the various site requirement for sanitary landfilling. 7

(b) Define 'Composting'. Explain the different types of composting. 7

**OR**

12. (a) Draw a neat sketch of 3T diagram and state the advantages and disadvantages of incineration. 7

(b) How to control leachate and gas from sanitary land fill ? 7