Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (CE)/SEM-8/CE-801/2/2012

2012

ENVIRONMENTAL POLLUTION AND CONTROL

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) The liquid wastes originating from residential and industrial buildings, are collectively called

a) domestic sewage b) combined sewage

c) sanitary sewage d) none of these.

ii) The sewer which transports the sewage to the point of treatment, is called

a) house sewer b) main sewer

c) outfall sewer d) none of these.

iii) For Indian cities, like Delhi or Kolkata, the per capita sewage production may be of the order of

a) 500 litres b) 200 litres

c) 100 litres d) none of these.

iv) BOD_5 represents 5 days' biochemical oxygen demand at a temperature of

a) 0°C b) 20°C

c) 30°C d) none of these.

v) Between BOD and COD, the greater of the two,

a) is BOD

b) is COD

c) both are equal

d) depends on sewage characteristics.

vi) During preliminary treatment of sewage

a) oils and greases are removed by skimming tanks

b) floating materials are removed by screening

c) grit and sand are removed by grit chambers

d) all of these are correct.

vii) Ozone depletion is a consequence of

a) greenhouse effect

b) emissions of volatile organic carbon

c) emissions of CFC

d) emissions of nitrogen oxides.

viii) Motor Vehicles Act was enacted in the year

a) 1976 b) 1981

c) 1984 d) none of these.

ix) During temperature inversion in atmosphere air pollutants tend to

a) accumulate above inversion layer

b) accumulate below inversion layer

c) disperse laterally

d) disperse vertically.

x) According to the WHO's reports of 1992, the most polluted city in the world, is

a) Delhi b) Bangkok

c) New York d) Tokyo.

xi) Air pollution may be caused by

a) human activities

b) natural disastrous events

c) both (a) and (b)

d) none of these.

xii) The Respiratory Suspended Particulate Matter (RSPM) concentration includes all particles in an air mass of size up to

a) 10 micron b) 25 micron

c) 50 micron d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

$3 \times 5 = 15$

2. What is noise ? Explain the concept of noise level in terms of Sound Pressure, Sound Power and Sound Intensity with relevant mathematical expressions. Explain the terms 'bale' and 'decibel' in this respect. 1 + 3 + 1

3. Differentiate between harmful ozone and beneficial ozone. Justify the contribution of ChloroFluoro Carbons (CFCs) in 'Ozone Layer Depletion' problem with suitable chemical reactions. 2 + 3

4. Differentiate between the primary and secondary air pollutants and enumerate the various such pollutants of both the categories. Explain each in detail.

5. How does air pollution affect human health, plants, materials and climate ?

6. Write notes on any *two* of the following : $2 \times 2\frac{1}{2}$

   i) Electrostatic precipitators

   ii) Venturi-scrubbers

   iii) Cyclone collectors

   iv) Fabric filters.

7. Enumerates various air pollutants for which National Ambient Air Quality Standards have been given in India. Explain the various non-point sources contributing to air pollution. 3 + 2

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) While recording *A*-weighted sound levels, 4 readings have been taken at a site at different times of a day. These readings are : 20, 56, 66 and 42dB(A)re : 20mPa. What is the average sound level ? 10

   b) Mention typical values of acceptable sound levels as per I.S. code for the following : 5

      i) Rural areas

      ii) Urban Residential areas

      iii) City areas

      iv) Industrial areas.

9. Write brief notes on any *three* of the following : 3 × 5

   i) Acid rains and their harmful effects on environment

   ii) Global warming and greenhouse gases

   iii) Montreal protocol

   iv) Kyoto protocol

   v) Acid-mine-drainage.

10. Differentiate between the Environment Lapse Rate (ELR) and Adiabatic Lapse Rate (ALR). Also differentiate between ALR and Dry & Wet ALRs.

11. a) What is meant by the effective height of a chimney and how is it computed ? What is its use ? 5

    b) Determine the effective height of a stack with the following data : 10

        i) Physical stack is 180 m tall with 0·95 m inside diameter

        ii) Wind velocity is 2·75 m/sec

        iii) Air temperature is 20°C

        iv) Barometric pressure is 1000 millibars

        v) Stack gas velocity is 11·12 m/sec.

        vi) Stack gas temperature is 160°C.

12. What do you understand by atmospheric dispersion ? Write down the equation for detemining ground level concentration of pollutant. Where does the maximum ground level concentration occur ?

    A thermal power plant burns coal at the rate of 7·5 tonnes/hr. and discharges the flue gases through a stack having effective height of 95 m. The coal has a

sulphur content of 4·6%. The wind velocity at the top of the stack is 8 m/s. The atmospheric conditions are slightly unstable.

a) Determine the ground surface concentration of SO_2 and the distance from the stack at which this occurs.

b) Determine the ground surface concentration of pollutants at a distance 2000 m down wind at centre line of the plume.

[Provide Δ_y *v/s* x and Δ_z *v/s* x for different atmospheric stabilities] 5 + 10