

**ENVIRONMENTAL POLLUTION & CONTROL
(CIVL 4163)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

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

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Which of the following is not a major constituent of a photochemical smog?
(a) PAN (b) CO (c) HC (d) O₃.
- (ii) 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.
- (iii) In an atmosphere under super-adiabatic lapse rate conditions, the emission from a chimney produces a plume describable as
(a) coning (b) lofting
(c) looping (d) fumigation.
- (iv) Hairs of our nose can remove all particles of size, greater than
(a) 1 mm (b) 1 micron
(c) 10 micron (d) 100 micron.
- (v) The device, which can be used to control gaseous as well as particulate pollutants in the industrial emissions, is known as
(a) cyclone collector (b) spray tower
(c) dynamic precipitator (d) fabric filters.
- (vi) The common audible range of sound is between
(a) 10 - 10,000 Hz (b) 20 - 20,000 Hz
(c) 45 - 45,000 Hz (d) 80 - 80,000 Hz.
- (vii) Acid rain occurs at the pH range of
(a) 1- 3.8 (b) 6.2-7.3 (c) 1- 5.6 (d) 5.8-7.

- (viii) Ozone is formed in the atmosphere due to the action of
(a) ultra-violet rays on oxygen (b) infrared rays on oxygen
(c) gamma rays on oxygen (d) x-rays on oxygen.
- (ix) The Motor Vehicles Act was enacted in the year
(a) 1976 (b) 1981 (c) 1984 (d) none of these.
- (x) Which of the following is the acidic phase of the landfill?
(a) 1st stage (b) 5th stage
(c) 2nd stage (d) 3rd stage.

Group - B

2. (a) A thermal power plant burns coal at the rate of 8 tons per hour and discharges the flue gases through a chimney having effective height of 90m. The coal has a sulphur content of 4.5%.The wind velocity at the top of the stack is 7.5m/s. The atmospheric conditions are slightly unstable.
(i) Determine the maximum ground level concentration of SO₂ and the distance from the stack at which this occurs.
(ii) Determine the ground level concentration at a distance 2000m downwind at centre line of the plume and also at a crosswind distance of 400m on either side of the centre line.
- (b) Name any two secondary pollutants and explain their formation in detail.
- 8 + 4 = 12**
3. (a) Define effective height of a stack with diagram.
- (b) A factory uses 1.5 Ml of fuel oil per month. The exhaust gases from the factory contain the following quantities of pollutants per Ml per year:
(i) Particulate matter = 4 t/year
(ii) SO₂ =20 t/year
(iii)NO_x = 5 t/year
(iv)HC, CO and others = 3 t/year
Determine the safe height of the chimney required for safe dispersion of the pollutants.
- (c) Differentiate between Environmental Lapse Rate (ELR) and Adiabatic Lapse Rate (ALR).

3 + 5 + 4 = 12

Group – C

4. (a) Discuss in brief the method of treating wastewater from a dairy industry — provide a flowchart.
- (b) Write short notes on the following:
 (i) Gravitational Settling Chamber
 (ii) Cyclone Collectors.

5 + 7 = 12

5. (a) Give the composition of a cotton textile mill waste. Explain with the help of flow diagram, how its wastewater is treated.
- (b) Write a short note on 'Electrostatic Precipitators'.

6 + 6 = 12**Group – D**

6. (a) What is noise? Explain the concept of noise level in terms of sound pressure, sound power and sound intensity with relevant mathematical expressions.
- (b) 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?

5 + 7 = 12

7. (a) Discuss in details all the measures taken for controlling noise pollution.
- (b) Define greenhouse effect. How does it relate to global warming? Name the gases related to greenhouse effect.

7 + 5 = 12**Group – E**

8. (a) Write a short note on the Water (Prevention and Control of Pollution) Act, 1974 .
- (b) Write in brief about hauled container system with a neat sketch.

6 + 6 = 12

9. (a) A total of 11 apartment complexes and commercial establishments have entered into a contract with a solid waste collection firm to collect their solid waste. The discarded volume of solid waste to be collected is 96m³ per collection day. Determine the number of trips

required on collection day, the size of the collection vehicle, and the size of the container to be provided. Assume $r = 2.5$ and for simplicity, assume that each of the 11 sources contributes the same amount of solid waste. Make any additional assumptions necessary.

- (b) What are the basic aspects in landfill implementation?

10 + 2 = 12