AIR AND NOISE POLLUTION
(CIVL 3241)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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)   Acid rains are caused by the following pollutants
   (a) SO_2 and O_3 (b) SO_2 and NO_X (c) NO_X and O_3 (d) CO and SO_2

   (ii)   When Adiabatic Lapse Rate (ALR) is more than Environmental Lapse Rate (ELR), then the ELR can be called as
   (a) Super adiabatic lapse rate   (b) Sub adiabatic lapse rate
   (c) Dry adiabatic lapse rate   (d) Wet adiabatic lapse rate.

   (iii)   Select the primary air pollutants among the following
   (a) Sulphur dioxide and Nitrogen Oxides
   (b) Ozone and Carbon monoxide
   (c) Sulphur dioxide and Ozone
   (d) Nitrogen oxide and Ozone.

   (iv)   When was the Water (Prevention and Control of Pollution) Act enacted by the Indian parliament?
   (a) 1970   (b) 1974   (c) 1980   (d) 1985.

   (v)   *Leachate* is a colored liquid, that comes out from
   (a) Septic tank   (b) Sanitary landfill
   (c) Compost plants   (d) Aerated lagoons.

   (vi)   Electrostatic precipitators are used as pollution control device for the separation of
   (a) SO_2 (b) NO_X (c) Hydrocarbon   (d) Particulate matter.

   (vii)   Which of the following parameters is not included in the routine characterization of solid waste for its physical composition?
   (a) Moisture content   (b) Density
   (c) Particulate size analysis   (d) Energy value.

(viii)   Sound becomes hazardous noise pollution at decibels
(a) > 30   (b) > 80 dB   (c) > 100 dB   (d) > 120 dB.

(ix)   The unit for frequency of sound is
(a) Hertz   (b) Decibels   (c) Pascal   (d) Newton.

(x)   The average consumption of air by an adult human being is of the order of
(a) 5kg   (b) 12kg   (c) 25kg   (d) 32kg.

Group – B

2.   (a)   Differentiate between: Environmental lapse Rate (ELR) and Adiabatic Lapse Rate (ALR). Also differentiate between dry and wet ALRs.

(b)   Write a short note on inversion. Explain in details about subsidence and radiation inversion.

5 + 7 = 12

3.   (a)   What do you mean by secondary pollutants?   Explain the formation of photochemical smog.

(b)   What do you mean by the effective height of a chimney? During rush hour on a busy road crossing, nearly 1200 vehicles ply per hour at an average speed of 20kmph. Of these about 70% cars use leaded petrol. The average fuel consumption is one litre for an average of 8km of travel. Considering that 70% of the lead present in the fuel is emitted in the form of particulate aerosol. Find the emission rate of lead aerosol in the ambient air.
(Given concentration of lead in the fuel 0.4µg/L)

5 + (2 + 5) = 12

Group – C

4.   Write short notes on any three of the following (Mention the merits, demerits and the principle with neat sketches):
(i)   Electrostatic precipitators.
(ii) Venturi-scrubbers
(iii) Cyclone collectors.
(iv) Gravitational settling chambers.

(3 × 4) = 12

5.   (a)   Discuss in brief the method of treating wastewater from a diary industry (with flow chart).

(b)   Write short notes on the following waste water treatment units:
(i)   Skimming tank.
(ii) Reverse Osmosis.

6 + 6 = 12

Group – D

6. (a) Differentiate between continuous noise, intermittent noise and impulse noise.

   (b) Enumerate the measures that may be taken to have an effective control on Noise pollution.

   5 + 7 = 12

7. (a) 50 dB noise lasting for 55 mins is followed by 90 dB noise lasting for 5 mins. What is L_{eq} of this noise? Write a short note on Global warming.

   (b) Traffic noise data are given below in the table. Compute L_{eq}

Time (s)	10	20	30	40	50	60	70	80	90	100
Noise (dBA)	70	80	79	69	86	76	74	81	75	74

   (2 + 3) + 7 = 12

Group – E

8. (a) What do you understand by 'Sanitary land filling'? Draw a neat sketch and explain the filling methods adopted in such filling practices.

   (b) Solid waste from an industrial park is to be collected in large containers (drop boxes), some of which will be used in conjunction with stationary compactors. Based on traffic studies on similar parks, it is estimated that the average time to drive from the garbage to the first container (t_1) and from the last container (t_2) to the garage each day will be 15 and 20 mins respectively. If the average time required to drive between the containers is 6min and the one-way distance to disposal site is 25km (speed limit: 88km/h), determine the number of containers that can be emptied per day, based on an 8-h workday. (pc + uc = 0.4h/trip; s = 0.133 h/trip; a = 0.016h/trip; b = 0.011 h/km).

   5 + 7 = 12

9. (a) Describe with proper sketch about the different phases of landfill .

   (b) Write a short note on The Air (Prevention and Control Pollution) Act, 1981.

   7 + 5 = 12

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