

**AIR AND NOISE POLLUTION
(CIV3131)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) When Environmental Lapse Rate (ELR) is more than Adiabatic Lapse Rate (ALR) then the environment is said to be
(a) Stable (b) Unstable
(c) Neutral (d) None of the above
- (ii) Which of the following is an engineered control device for gaseous pollutants?
(a) Wet scrubber (b) Gravity settler
(c) Cyclone collector (d) Bag filter
- (iii) A rainfall is classified as acid if the pH is less than equal to
(a) 5.6 (b) 6.5 (c) 7.5 (d) 5.9
- (iv) The aerobic method of mechanical composting as practised in India
(a) Indore Method (b) Bangalore Method
(c) Bhopal Method (d) Nagpur Method
- (v) The ozone depletion in the stratosphere is chiefly caused by :
(a) CFCs (b) CO₂ (c) NO_x and O₃ (d) CH₄
- (vi) 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
- (vii) Automobile exhaust is mainly controlled by:
(a) Gravitational settling chamber (b) Catalytic converter
(c) Dust collector (d) Bio-oxidation process
- (viii) When the Matter Present Inside the Sanitary Landfill Breaks Down, Which of the Following Gas Generates?
(a) Methane (b) Nitrogen (c) Hydrogen (d) All of the above

- (ix) One Dobson Unit (DU) is equal to :
 (a) 1 mm (b) 0.1 mm (c) 0.01 mm (d) 0.001 mm
- (x) Subsidence inversion can be related to:
 (a) Cyclone (b) Anti cyclone (c) Radiation (d) Tornado

Fill in the blanks with the correct word

- (xi) Gaseous pollutants such as SO₂ and NO_x are commonly removed using _____ scrubbers.
- (xii) The ozone hole appears in Antarctica during _____.
- (xiii) A condition in which a layer of warm air traps pollutants close to the ground is known as _____.
- (xiv) The main component of smog that forms in urban areas is _____.
- (xv) A _____ is used to adjust the pH of wastewater by adding suitable alkaline / acidic agents.

Group - B

2. (a) During rush hour on a busy road crossing, nearly 1200 vehicles ply per hour at an average speed of 20 kmph. 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 is 0.4µg/L; assume bright day with light wind).
[[CIV3131.2 , CIV3131.3](Evaluate/HOCQ)]
- (b) Explain looping & coning plume in detail with relevant diagram.
[[CO1, CO3](Analyze/IOCQ)]
8 + 4 = 12
3. Write short notes on the various kinds of plumes formed in the following environmental conditions with relevant diagram: (i) Super-adiabatic environment (ii) ALR equivalent to ELR (iii) Extreme inversion conditions.
[[CIV3131.2 , CIV3131.3](Analyze/IOCQ)]
(4 × 3) = 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.
- [[CIV3131.4](Understand/LOCQ)]
(4 × 3) = 12
5. (a) Design a sludge digestion tank for 40,000 people. The sludge content per capita per day is 0.068kg. The moisture of the sludge is 94%. The sp. Gravity of the wet

sludge is 1.02 and 3.5 percent of the digester volume is daily filled with fresh sludge, which is mixed with the digested sludge. [[CIV3131.4](Evaluate/HOCQ)]

- (b) Define septic tank. State its advantages & disadvantages. [[CIV3131.4](Understand/LOCQ)]
8 + 4 = 12

Group - D

6. (a) Write short note on characteristics of three weighting networks. [[CIV3131.5](Apply/IOCQ)]
 (b) A traffic noise data is given below compute L_{eq} .

Time (in sec)	10	20	30	40	50	60	70	80	90	100
Noise (dB)	71	75	70	78	80	84	76	72	75	74

[[CIV3131.5](Analyse/HOCQ)]
4 + 8 = 12

7. (a) Differentiate between L_n , L_{eq} and L_{dn} in relation to expression of sound level. [[CIV3131.5](Analyze/IOCQ)]
 (b) While recording A- weighted sound level 4 readings have been taken at the site at different time of the day . These readings are : 50,56,60 and 42 dB(A) re: 20 μ Pa . What is the average sound level? [[CIV3131.5](Apply/HOCQ)]
6 + 6 = 12

Group - E

8. (a) What is “Sanitary landfill” and how is it practiced? [[CIV3131.6](Understand/LOCQ)]
 (b) Draw a neat sketch and explain the filling process adopted in such filling practices.(clearly explain the intermediate & final cover). [[CIV3131.6](Analyze/IOCQ)]
4 + 8 = 12
9. (a) Enumerate the various functions of Central Pollution control board. [[CIV3131.6](Understand/LOCQ)]
 (b) Solid waste from a new industrial park is to be collected in large container (drop boxes), some of which will be used in conjunction with stationary compactors. Based on traffic studies at the similar parks it is estimated that the average time to drive from the garage to the first container (t_1) and from the last container (t_2) to the garage each day will be 15 and 20 min., respectively. If the average time required to drive between containers is 6 min and the one-way distance to the disposal site is 25 km (speed limit: 88 km/h) , determine the number of containers that can be emptied per day, based on 8-h work day? [[CIV3131.6](Apply/HOCQ)]
6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	27.08	35.42	37.5

