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 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) Pre-cursors to Photochemical Oxidants are
(a) NO_x, VOCs and sunlight (b) SO_2, CO_2 and sunlight
(c) H_2S, CO and sunlight (d) SO_2, NH_3 and sunlight.

(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) The device which can be used to control gaseous as well as particulate pollutants in the industrial emissions is known as
(a) Cyclone separator (b) Spray tower
(c) Dynamic precipitator (d) Fabric filters.

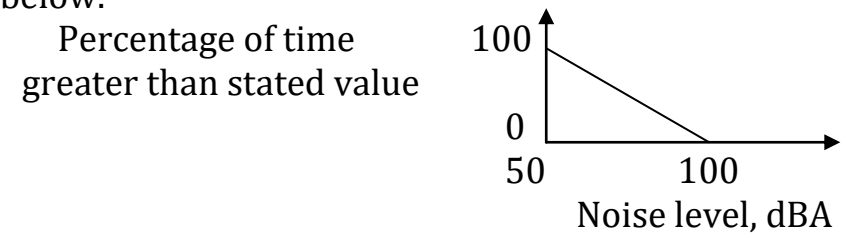
(iv) The ozone layer thickness is measured in
(a) Decibels (dB) (b) Dobson Units (DU)
(c) Becquerel (Bq) (d) none of these.

(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) Coning plume occurs under which conditions?
(a) Super adiabatic (b) Sub adiabatic
(c) Neutral (d) Inversion.

(viii) The cumulative noise power distribution curve at a certain location is given below.



The value of L_{40} is equal to
(a) 90 dBA (b) 70 dBA (c) 80 dBA (d) 60 dBA.

(ix) The minimum particle size removes by the gravitational chamber is
(a) >50μm (b) >10μm (c) >25μm (d) >0.5μm.

(x) Pyrolysis is a process in
(a) Water Treatment (b) Solid Waste Management
(c) Vehicular Air Pollution (d) Industrial Waste Treatment.

Group- B

2. (a) Differentiate between: Environmental Lapse Rate (ELR) and Adiabatic Lapse Rate (ALR). Also differentiate between dry and wet ALRs. [(CO3)(Remember/IOCQ)]

(b) Write a short note on inversion. Explain in details about subsidence and radiation inversion. [(CO2)(Remember/LOCQ)]

5 + 7 = 12

3. (a) What do you mean by secondary pollutants? Explain the formation of photochemical smog. [(CO1)(Understand/IOCQ)]

(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). [(CO3)(Anayze/HOCQ)]

(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. [(CO2)(Remember/LOCQ)]

(3 × 4) = 12

5. Discuss in detail about the suggested treatment for the following industries:
   (i) Diary Industry (Milk processing industries).
   (ii) Petro Chemical Industries. [(CO4)(Understand/IOCQ)]

(6 + 6) = 12

Group - D

6. (a) What is noise? Differentiate between L_{eq} and L_n in relation to expression of sound levels. [(CO5)(Remember/IOCQ)]
   (b) Enumerate the measures that may be taken to have an effective control on Noise pollution. [(CO5)(Remember/IOCQ)]

5 + 7 = 12

7. (a) 52dB(A) noise lasting for 54 minutes is followed by 96dB(A) noise lasting for 5 minutes. What is the L_{eq} of this noise? [(CO5)(Analyze/HOCQ)]
   (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	82	79	69	86	75	68	81	75	76

[(CO5)(Analyze/HOCQ)]

5 + 7 = 12

Group - E

8. (a) Write a short note on the water (Prevention and Control Pollution) act. [(CO5)(Remember/LOCQ)]
   (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). [(CO6)(Analyze/HOCQ)]

6 + 6 = 12

9. (a) Write short notes on the different methods of solid waste processing. [(CO6)(Remember/IOCQ)]
   (b) Differentiate between 'refuse' and 'garbage'. [(CO1)(Understand/LOCQ)]

9 + 3 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	29.16	46.88	23.96

Course Outcome (CO):

After the completion of the course students will be able to

1. Understanding the basic concepts of environmental pollution.
2. Ability to justify the use of pollution control equipment and their design.
3. Ability to identify air pollution problems.
4. Understand industry specific treatment technologies.
5. Capacity to assess the various aspects of noise pollution and understand the different environmental laws.
6. Get an overall understanding of various ways to manage solid waste

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question