

**ECOLOGY AND ENVIRONMENTAL ENGINEERING  
(MECH 4130)**

**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) Science that deals with the relationships between living organisms and their physical environment is known as  
(a) Environmental science (b) Biodiversity  
(c) Ecology (d) Biology
- (ii) Animals that consume only animal matter are referred as  
(a) Omnivores (b) Carnivores  
(c) Herbivores (d) Omni-Herbivores
- (iii) In Ecological Pyramid of Energy, the base line of the pyramid represents  
(a) Producers (b) Primary consumers  
(c) Secondary consumers (d) Tertiary consumers
- (iv) The lowest part of the layers of atmosphere is  
(a) Troposphere (b) Stratosphere  
(c) Mesosphere (d) Thermosphere
- (v) Which of the following is not considered as greenhouse gas?  
(a) Carbon dioxide (b) Nitrous oxide  
(c) Nitrogen (d) Methane
- (vi) Based on the particulate matter removal mechanism, the particulate-control equipment can be classified as  
(a) Force-field settlers (b) Fabric filters  
(c) Wet scrubbers (d) All of the above
- (vii) Catalytic converters are fitted in  
(a) Steam generators (b) Automobiles  
(c) Electrostatic precipitators (d) Baghouse filters

- (viii) What is the main cause of water pollution in bodies of water lakes and rivers?  
 (a) Agricultural runoff (b) Residential sewage  
 (c) Industrial discharges (d) Natural weathering of rocks.
- (ix) Noise level to be maintained in Commercial areas is  
 (a) 50dB (b) 70 dB  
 (c) 75 dB (d) 100 dB
- (x) Which of the following is a major source of thermal pollution of water bodies?  
 (a) Sewage treatment plants (b) Thermal power plant  
 (c) Solid waste disposal sites (d) all of these

*Fill in the blanks with the correct word*

- (xi) The ozone layer in the stratosphere absorbs a portion of the \_\_\_\_\_ radiation from the sun .
- (xii) The abbreviation 'NAAQS' stands for \_\_\_\_\_.
- (xiii) Particulate Matter (PM) typically have aerodynamic diameters less than or equal to \_\_\_\_\_.
- (xiv) Suspended solids in water are measured by \_\_\_\_\_.
- (xv) Lead poisoning mainly affects the \_\_\_\_\_ system of the human body.

### **Group - B**

2. (a) Analyze the problems associated with population growth. [[CO3](Analyze/10CQ)]  
 (b) Briefly describe various forms of pollutants and contaminants in environment. [[CO4](Understand/LOCQ)]  
**6 + 6 = 12**
3. (a) What are the different factors that environmental gradients can be related with? [[CO1](Remember/LOCQ)]  
 (b) Briefly describe the environmental threats our world is facing today and propose some feasible mitigation plans. [[CO5](Evaluate/HOCQ)]  
**6 + 6 = 12**

### **Group - C**

4. (a) Name the four distinct strata/zones of the atmosphere. [[CO3] (Remember/LOCQ)]  
 (b) What is meant by 'atmospheric stability'? Briefly discuss about the different factors that affect atmospheric stability. [[CO3] (Remember/LOCQ)]  
**4 + (2 + 6) = 12**
5. (a) Write a short note on the operational principle of a cyclone separator. [[CO5] (Understand /LOCQ)]  
 (b) State five advantages that justify the use of cyclone separators. [[CO5] (Remember/LOCQ)]  
**7 + 5 = 12**

## Group - D

6. (a) In a standard five-day BOD test,  
(i) why is the BOD bottle stoppered?  
(ii) why is the test run in the dark (or in a black bottle)?  
(iii) why is it usually necessary to dilute the sample? [[CO4](Analyse/IOCQ)]  
(b) Write notes on (i) Water Pollution and (ii) Water recycling. [[CO4](Remember/LOCQ)]  
**6 + 6 = 12**
7. (a) What are the effects of Water Pollution? [[CO4](Remember/LOCQ)]  
(b) Explain the negative impacts of thermal pollution in aquatic ecosystem. [[CO3](Analysis/IOCQ)]  
**6 + 6 = 12**

## Group - E

8. (a) Explain the process of handling hazardous waste to reduce the impact? [[CO4](Analyse/HOCQ)]  
(b) Suppose drinking water contains 1.0 mg/L of toluene and 0.01 mg/L of Tetrachloroethylene with RfD value of 0.01 mg/kg-day (C<sub>2</sub>Cl<sub>4</sub>). A 70kg adult drinks 2.5 L per day of this water for 10 years.  
(i) Does the hazard index suggest that this was a safe level of exposure?  
(ii) Tetrachloroethylene is a B2 carcinogen. What is the carcinogenic risk faced by someone drinking this water? Is it less than a goal of 10<sup>-6</sup>? [[CO5](Remember/LOCQ)]  
**5 + 7 = 12**
9. (a) What is solid waste management? Explain its causes and effects. [[CO2](Remember/LOCQ)]  
(b) Write a short note on control measures of solid waste management. [[CO2](Remember/LOCQ)]  
**6 + 6 = 12**

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	69.79	18.75	11.46

