

**ENVIRONMENTAL SCIENCES
(EVSC 2016)**

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) A green solvent should have characteristics of
(a) high toxicity (b) recyclable
(c) contaminating (d) all of the above.
- (ii) Environmental Impact Assessment (EIA) needs to
(a) evaluate a project (b) start a project
(c) stop a project (d) none of these.
- (iii) Acid rain is caused by the oxide of
(a) Nitrogen and Phosphorous (b) Nitrogen and Sulphur
(c) Sulphur and Phosphorous (d) none of these.
- (iv) The best method of biomedical waste disposal is
(a) incineration (b) composting
(c) landfill (d) none of these.
- (v) The industrial area noise is measured by
(a) L_{10} index (b) L_{eP_n} (c) L_{eq} (d) none of these.
- (vi) Minamata disease is associated with
(a) Mercury (b) Arsenic (c) Cadmium (d) Lead.
- (vii) Which of the following can be used for disinfection of water?
(a) Hydrogen peroxide (b) Chlorine
(c) Ozone (d) Both (b) & (c).
- (viii) Which one of the following is true for a waste water sample?
(a) $BOD < COD$ (b) $BOD > COD$
(c) $BOD = COD$ (d) $BOD = 2 \times COD$.
- (ix) A natural phenomenon that becomes harmful due to pollution is
(a) global warming (b) ecological balance
(c) desertification (d) green house effect.

- (x) Freon is
(a) CHCl_3 (b) CFCl_3 (c) CBrF_3 (d) none of these.

Fill in the blanks with the correct word

- (xi) The example of a commonly used green solvent is _____.
- (xii) The greenhouse effect is pronounced in Venus due to the presence of _____.
- (xiii) Bhopal Gas Tragedy occurs due to the leakage of _____ gas.
- (xiv) The oxidizing agent used in COD test is _____.
- (xv) Unit of intensity of sound is _____.

Group - B

2. (a) What is meant by 'Environment'? Discuss in brief the ecological factors cause changes in the environment. [[CO1/LOCQ]]
- (b) What is maximum sustainable yield? Following logistic growth of population, prove that the maximum sustainable yield will be obtained when population is half the carrying capacity. [[CO2/IOCQ]]
- (c) Write down the differences between Environmental Impact assessment and Environmental Audit. [[CO3/LOCQ]]
- 5 + (1 + 3) + 3 = 12**
3. (a) What is meant by volatile organic compounds (VOCs)? Why they are harmful to our environment? What are the common alternatives to VOCs? [[CO1](Understand)/LOCQ]]
- (b) Prove that for exponential growth of population, $N_t = N_0 e^{Rt}$ (symbols have their usual meaning). What is the necessity of population growth study? [[CO4/IOCQ]]
- (c) Write a short note on 'Chernobyl Disaster'. [[CO2](Remember)/LOCQ]]
- (1 + 2 + 2) + (2 + 2) + 3 = 12**

Group - C

4. (a) Define lapse rate. Classify lapse rate. Why troposphere lapse rate is reversed to that of stratospheric lapse rate. [[CO3/LOCQ]]
- (b) Discuss criteria pollutants with examples? Why they are named so? [[CO2/LOCQ]]
- (c) What is black body? Consider the sun as a perfect sphere of radius 6.8×10^8 m. Calculate the energy radiated by the sun in one hour. (Surface temperature of the sun = 5800 K). Stefan's constant = $5.67 \times 10^{-8} \text{ Jm}^{-2} \text{ S}^{-1}\text{K}^{-4}$). [[CO4/IOCQ]]
- (1 + 1 + 2) + (3 + 1) + (1 + 3) = 12**
5. (a) How does acid rain form? What are the effects of acid rain on aquatic life? [[CO4]/(Understand/LOCQ)]
- (b) Discuss in detail any one short technologies involved in controlling particulate matter emission. [[CO3]/(Understand/LOCQ)]

- (c) Why ozone layer is important to us? Which zone of atmosphere contains ozone layer? What is Montreal protocol?
[[CO4]/(Analyse/IOCQ)]
(2 + 2) + 4 + (1 + 1 + 2) = 12

Group - D

6. (a) What are pesticides? Why are they so dangerous for living organisms?
[[CO6](Remember/LOCQ)]
- (b) Write down the causes of 'Thermal Pollution' in water. What are the effects of thermal pollution?
[[CO3/HOCQ]]
- (c) Draw and discuss briefly about 'Trickling Filter' used in the waste water treatment.
[[CO5] (Remember/LOCQ)]
(1 + 3) + (2 + 2) + 4 = 12
7. (a) What do you understand by 'Eutrophication' in lake? How eutrophication can be controlled?
[[CO1/LOCQ]]
- (b) Define Biological oxygen Demand. The BOD reaction rate constant is 0.3/day. Calculate the expected BOD₅ if BOD₂ is 150 mg/L. (Suppose temperature is constant). What are the differences between BOD and COD?
[[CO2/IOCQ]]
- (c) Write down the purposes of primary and secondary treatment in the process of waste water treatment.
[[CO3/LOCQ]]
(2 + 3) + (1 + 2 + 2) + 2 = 12

Group - E

8. (a) What are the advantages of recycling? Discuss how some valuable products can be obtained by recycling of solid waste materials.
[[CO5/LOCQ]]
- (b) Write down the differences between noise and sound. Write the drawbacks of dBA scale.
[[CO3/LOCQ]]
- (c) Calculate the intensity of 140dB sound. Is the sound tolerable to human ear? Justify your answer.
[[CO6/IOCQ]]
(2 + 2) + (3 + 2) + 3 = 12
9. (a) Write down the characteristics that are attributed to hazardous waste.
[[CO2]/(Remember/LOCQ)]
- (b) What do you understand by land pollution? How does modern agricultural practice affect the soil pollution?
[[CO1]/(Understand/LOCQ)]
- (c) Explain human acoustics by schematic diagram. What are the effects of noise pollution on living organism?
[[CO2]/(Remember/LOCQ)]
4 + (1 + 2) + (2 + 3) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	70.83	25	4.16

Course Outcome (CO):

After the completion of the course students will be able to

1. Understand the natural environment and its relationships with human activities.
2. Characterize and analyze human impacts on the environment.
3. Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
4. Educate engineering leaders who can work in a multi-disciplinary environment to anticipate and address evolving challenges of the 21st century.
5. Understand and implement scientific research strategies, including collection, management, evaluation, and interpretation of environmental data.
6. Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.

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