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) Environment Protection Act of India was enacted in the year
(a) 1984 (b) 1982 (c) 1986 (d) 1985.

(ii) The primary air pollutant is
(a) O_3 (b) PAN (c) SO_2 (d) HCHO.

(iii) The maximum sustainable yield is obtained when the population is
(a) half the carrying capacity
(b) double the carrying capacity
(c) two third of the carrying capacity
(d) three fourth of the carrying capacity.

(iv) Railway traffic noise is measured by
(a) L_{10} index (b) L_eP_n
(c) L_{eq} (d) None of these

(v) Which of the following cannot be used for disinfection of water?
(a) Hydrogen peroxide (b) Chlorine
(c) Ozone (d) Both (b) and (c).

(vi) Incineration of waste are generally performed at temperature range
(a) 900-1200 °C (b) 10-50 °C
(c) 200-300 °C (d) 600-700 °C.

(vii) Solid waste management involves
(a) collection of solid waste only
(b) collection and storage of solid waste only
(c) collection and disposal of solid waste only
(d) collection, storage and disposal of solid waste.

(viii) The atmosphere is neutrally stable under condition of
(a) ELR>ALR (b) ELR<ALR
(c) ELR=ALR (d) None of these

(ix) The cause of eutrophication is
(a) Increase of pathogens (b) Increase of BOD
(c) Increase in productivity of algae (d) Increase of DO

(x) The main product of photochemical smog is
(a) PAN (b) O_3 (c) H_2SO_4 (d) NH_3

Fill in the blanks with the correct word

(xi) The Chernobyl disaster occurred in the year of_____.

(xii) The Value of Earth's ALBEDO is _____.

(xiii) The best method of biomedical waste disposal is _____.

(xiv) Itai-Itai disease is caused by _____ poisoning.

(xv) Unit of intensity of sound is _____.

Group - B

2. (a) What is environmental impact assessment? What are the steps involved in an environmental impact assessment process? *[(CO1/LOCQ)]*
(b) Explain renewable and non-renewable resources providing suitable example. *[(CO2/LOCQ)]*
(c) What do you understand by green chemistry? Write down the main objectives of green chemistry. *[(CO5/LOCQ)]*
(d) Write the cause of Bhopal Gas Tragedy. *[(CO2) / (LOCQ)]*

(1 + 3) + 2 + (2 + 2) + 2 = 12

3. (a) Following logistic growth of population, derive the expression for logistic growth rate constant $r = (1/t^*) \ln (K/N_0 - 1)$. *[(CO3)/(IOCQ)]*
(b) Write short note on "Chernobyl Disasters". *[(CO5)/(LOCQ)]*
(c) Give a brief account of room temperature ionic liquid. *[(CO3)/(LOCQ)]*
(d) Write a note on sustainable development? *[(CO6)/(LOCQ)]*

3 + 4 + 3 + 2 = 12

Group - C

4. (a) Discuss in details about greenhouse effect? Why existence of life is not possible in Venus. *[(CO3)/(LOCQ)]*
(b) What do you understand by suspended particulate matter? Distinguish between pollutants and contaminants. *[(CO2)/(LOCQ)]*
(c) What is adiabatic lapse rate? Write down the three conditions of atmospheric stability in terms of lapse rate? *[(CO3)/(LOCQ)]*

(d) Measurements made outside the earth's atmosphere indicate that the solar spectrum peaks at 0.24 μm. If the sun is considered to be a perfect black body what would be its temperature be? [Given 'b' = 0.002898 mK]. *[(CO3)/(IOCQ)]*

(2 + 1) + (1 + 2) + (2 + 2) + 2 = 12

5. (a) What is atmosphere? Draw the temperature profile curve of the atmosphere. *[(CO1)/IOCQ)]*

(b) How sulphurous smog formed? Write the differences between sulphurous smog and photochemical smog? *[(CO2)/LOCQ)]*

(c) Write short note on cyclone separator. *[(CO5)/(LOCQ)]*

(d) Deduce the formula of CFC-11. *[(CO2)/(IOCQ)]*

(1 + 3) + (2 + 2) + 2 + 2 = 12

Group - D

6. (a) Describe using suitable diagram how an "Oxidation Pond" is used in secondary treatment of waste water? *[(CO5/LOCQ)]*

(b) Considering biodegradation of organic matter in water as first order reaction show that $BOD_t = C_0 (1-e^{-kt})$, where terms have their usual meanings. *[(CO6/IOCQ)]*

(c) What do you mean by oxygen demanding waste? What are the harmful effects of low DO level in water? *[(CO6/LOCQ)]*

(d) What do you mean by hard water? Why hard water cannot be used in boilers? *[(CO4/LOCQ)]*

3 + 3 + (1 + 2) + (1 + 2) = 12

7. (a) What is the importance of Biological Oxygen Demand (BOD) test? What is the difference between BOD and COD methods? *[(CO1)/(LOCQ)]*

(b) Discuss different types of Eutropication. *[(CO1)/(LOCQ)]*

(c) Describe the various processes involved in surface water treatment to make it potable. *[(CO5)/(LOCQ)]*

(d) Write down the sources of generation of Arsenic (As) in water and describe its biochemical effects. *[(CO2)/(LOCQ)]*

(1 + 2) + 2 + 4 + (1 + 2) = 12

Group - E

8. (a) What is meant by hazardous wastes? Discuss briefly about the chemical treatment of hazardous wastes. *[(CO5)/LOCQ)]*

(b) What do you mean by noise pollution? What are the effects of noise pollution on living organism? *[(CO6/LOCQ)]*

(c) Calculate the intensity of 101dB sound. (Reference intensity = $1x10^{-12}$ W/m^2). *[(CO6/IOCQ)]*

(2 + 2) + (2 + 3) + 3 = 12

9. (a) Discuss composting process of solid waste disposal. What are the advantages of this process? *[(CO5)/(LOCQ)]*

(b) What are the biomedical wastes? What is the best way to dispose biomedical wastes? *[(CO5)/(LOCQ)]*

(c) If two machines produce 50 dB sounds simultaneously. What will be the total sound level? What are the different equipments are used to measure noise?

[(CO5)/(IOCQ)]

(2 + 2) + (1 + 2) + (3 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	79.16	20.83	0

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.*