ENVIRONMENTAL SCIENCES
(EVS2016)

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) Bhopal Gas Tragedy occurred in the year
(a) 1964 (b) 1974 (c) 1984 (d) 1994

(ii) The logistic growth rate curve look like
(a) V-shape (b) s-shape (c) U-shape (d) None of these

(iii) The primary air pollutant is
(a) O_3 (b) PAN (c) CO_2 (d) HCHO

(iv) The coldest region of the atmosphere is
(a) Troposphere (b) Stratosphere
(c) Mesosphere (d) Thermosphere.

(v) The catalyst used in catalytic converter is
(a) Ni (b) Pt (c) Fe (d) Cu

(vi) Eutrophication means
(a) Thermal change in water
(b) Filling of water body with aquatic plants due to extra nourishment
(c) Solid waste present in water
(d) Increase of heavy metal contamination.

(vii) Minamata disease is associated with
(a) Mercury (b) Arsenic (c) Cadmium (d) Lead

(viii) Temporary hardness of water is due to the presence of
(a) Cl^- (b) HCO_3^- (c) NO_3^- (d) SO_4^{2-}

(ix) Aircraft noise is measured by
(a) L_eP_n (b) L_{eq}
(c) L_{10} (18 hrs) index (d) None of these

(x) Solid waste management involves
(a) Collection of solid waste (b) Storage of solid waste
(c) Disposal of solid waste (d) All of the above.

Fill in the blanks with the correct word

(xi) Oleic acid is an example of _____ solvent.

(xii) Ozone acts as a pollutant when resides in _____.

(xiii) The most important measure of water quality is the amount of _____ present in it.

(xiv) The most unwanted MSW can be _____.

(xv) The noise level which is painful to a human being is above _____.

Group - B

2. (a) Give a brief account of the various components of environment.
[(CO1)(Remember/LOCQ)]

(b) Write the cause and after effect of Bhopal Gas Tragedy.
[(CO2)(Remember/LOCQ)]

(c) What is green chemistry? What are the main concepts of green chemistry?
[(CO6)(Remember/LOCQ)]

4 + 4 + (2 + 2) = 12

3. (a) Following logistic growth of population, derive the expression for logistic growth rate constant $r = (1/t^*) \ln (K/N_0 - 1)$. Where terms have their usual meanings.
[(CO5)(Apply/IOCQ]

(b) Give a brief account of room temperature ionic liquid. *[(CO6)(Remember/LOCQ)]*

(c) What do you mean by environmental impact assessment? Give a brief account of the steps involved in an environmental impact assessment process.
[(CO6)(Remember/LOCQ)]

4 + 3 + (2 + 3) = 12

Group - C

4. (a) What do you mean by adiabatic lapse rate? Write down the three conditions for atmospheric stability in terms of lapse rate. *[(CO5)(Remember/LOCQ)]*

(b) What do you mean by green house effect? What are the important green house gases? *[(CO3)(Remember/LOCQ)]*

(c) Discuss the mechanism of ozone layer depletion. Deduce the chemical formula of CFC-12. *[(CO2)(Apply/IOCQ)]*

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

5. (a) Explain the formation of acid rain with chemical reactions. What is the effect of acid rain on aquatic life? *[(CO3)(Remember/LOCQ)]*

(b) Write short note on 'scrubber' technology to control air pollution.
[(CO6)(Apply/IOCQ)]

(c) What is global temperature model? Prove on the basis of simple global temperature model that the earth's surface temperature is -19°C. *[(CO1)(Remember/LOCQ)]*

(3 + 2) + 3 + 4 = 12

Group - D

6. (a) Write down the differences between BOD and COD methods. Why it is necessary to cover the bottle with a stopper in a BOD_5 test? *[(CO4)(Apply/IOCQ)]*

(b) Explain "Oxidation Pond" for waste water treatment. *[(CO4)(Remember/LOCQ)]*

(c) What are the sources of Arsenic (As) contamination in water? Describe the biochemical effects of the above heavy metal. *[(CO1)(Remember/LOCQ)]*

(d) Mention the names of different kinds of eutrophication. *[(CO1)(Remember/LOCQ)]*

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

7. (a) What is thermal pollution of water? How thermal pollution can be controlled? *[(CO1)(Remember/LOCQ)]*

(b) What is Chemical Oxygen Demand (COD)? After treatment of sewage of a location, was subjected to BOD_5 test. The initial DO was 8.0 mg/L and the final 3.0 mg/L. 30 ml of waste water was diluted with 270 ml unseeded water. Find BOD of the treated sewage. *[(CO2)(Apply/IOCQ)]*

(c) Explain with diagram the "Rotating Biological Contractor (RBC)" used in secondary treatment of waste water. *[(CO4)(Remember/LOCQ)]*

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

Group - E

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

(b) Mention the various steps involved in the technical process for controlling noise pollution. *[(CO3)(Remember/LOCQ)]*

(c) If two machines produce 50 dB sounds simultaneously. What will be the total sound level? Explain human acoustics by schematic diagram. *[(CO)(Apply/IOCQ)]*

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

9. (a) Discuss in details the different types of noise based on source. Calculate the intensity of 110 dB sound (Reference intensity = $1x10^{-12}$ W/m^2). *[(CO6)(Apply/IOCQ)]*

(b) What are the biomedical wastes? What is the best way to dispose biomedical wastes? *[(CO4)(Remember/LOCQ)]*

(c) How will you convert from waste to wealth? *[(CO5)(Remember/LOCQ)]*

(4 + 2) + (2 + 1) + 3 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	69	31	0