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
<u>any 4 (four)</u> from Group B to E, taking <u>one</u> 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)   The Environmental Protection Act of India was enacted in the year
         (a) 1974   (b) 1986
         (c) 1997   (d) 1965

   (ii) Which one of the following is a green solvent?
         (a) Benzene   (b) Chloroform
         (c) Ethyl Lactate   (d) Acetone

   (iii) Which is an example of inexhaustible energy source?
         (a) Coal   (b) Petroleum
         (c) Biomass   (d) Mineral

   (iv) Air pollutant which reduces oxygen carrying capacity of haemoglobin is
         (a) Carbon monoxide   (b) Ammonia
         (c) Carbon dioxide   (d) Hydrogen sulphide

   (v)   The main product of photochemical smog is
         (a) PAN   (b) O_3
         (c) H_2SO_4 (d) NH_4Cl

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

   (vii) Water will be considered as saline if the TDS value is
         (a) < 500 mg/L   (b) < 1500 mg/L
         (c) equal to 3000 mg/L   (d) > 5000 mg/L

   (viii) Lakes with poor nutrient status are known as
         (a) Mesotrophic   (b) Oligotrophic
         (c) Eutrophic   (d) None of these

(ix)   The noise threshold limit values for 16 hours is
(a) 80 Dba   (b) 90 dBA
(c) 100 dBA   (d) 110 dBA

(x)   Hazardous waste should have characteristics such as
(a) Reactivity   (b) Toxicity
(c) Corrosivity   (d) All the above

Fill in the blanks with the correct word

(xi)   The first room temperature ionic liquid is _____

(xii) The value of earth's albedo is _____.

(xiii) The purpose of the secondary treatment is to remove mainly_____ from the waste water.

(xiv) In the industrial area noise is measured by _____.

(xv)   The unit of intensity of sound is _____.

Group - B

2. (a)   Following exponential growth model show that doubling time and half life time of a population will be numerically equal when the growth rate constant and decay rate constant have same value.   *[(CO5)(Apply/IOCQ)]*

   (b)   What are the main objectives of Environmental Protection Act of India 1986?
                                                          [(CO6)(Remember/LOCQ)]

   (c)   What do you mean by green solvent? Differentiate between safe and green solvents giving suitable examples.   *[(CO6)(Remember/LOCQ)]*

   4 + 3 + (2 + 3) = 12

3. (a)   What is logistic growth of population? The human population follow a logistic growth rate until it stabilizes at 10 billion. In the year 1970, the world population was 2 billion with growth rate of 2 %. When will the population reach 5 billion?
                                                          [(CO5)(Apply/IOCQ)]

   (b)   What is renewable resource? Classify renewable resources providing suitable examples.   *[(CO6)(Remember/LOCQ)]*

   (c)   What are the VOCs? Mention the harmful effects of VOCs on human health.
                                                          [(CO6)(Remember/LOCQ)]

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

Group - C

4. (a)   Why the temperature decreases with increase of height in troposphere? Mention minimum temperature achieved in troposphere.   *[(CO1)(Apply/IOCQ)]*

   (b)   Why are CO_2 and water vapour (H_2O) greenhouse gases, but N_2 and O_2 are not?
                                                          [(CO3)(Remember/LOCQ)]

   (c)   Write down the sources of generation of carbon monoxide (CO) and oxides of nitrogen (NO_x). Also describe their harmful effect on human being.
                                                          [(CO2)(Remember/LOCQ)]

(d)   Write short note about on 'Baghouse filter'.   *[(CO6)(Remember/LOCQ)]*

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

5. (a)   Consider the sun as a perfect sphere of radius 6.8×10^8 m. Calculate the energy radiated by the sun in 12 hours. Surface temperature of sun is 6200K and Stefan's constant $\sigma = 5.67 \times 10^{-8}$ $Jm^{-2}s^{-1}K^{-4}$.   *[(CO3)(Apply/IOCQ)]*

(b)   What is ozone depleting substance? Deduce the chemical formula of CFC-115. Write a short note on 'Montreal protocol'.   *[(CO3)(Remember/LOCQ)]*

(c)   What do you understand by suspended particulate matter? Describe its sources of formation and harmful effect on environment.   *[(CO3)(Remember/LOCQ)]*

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

Group - D

6. (a)   Explain how a newly formed lake gradually becomes a Eutrophic lake.
[(CO1)(Remember/LOCQ)]

(b)   Why seeded water is used for dilution in a BOD test? Why the BOD_5 test is run in dark?   *[(CO2)(Remember/LOCQ)]*

(c)   Explain briefly the steps involved in surface water treatment to make it potable.
[(CO4)(Remember/LOCQ)]

(d)   What is the main purpose of using tertiary treatment of water? Write suitable reaction for separation of phosphate from water?   *[(CO3)(Remember/LOCQ)]*

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

7. (a)   Why the heavy metals (As, Pb, Hg, Cd) are called nephrotoxin? Write the harmful effects of one of these heavy metals contaminated in water.   *[(CO1)(Remember/LOCQ)]*

(b)   What is the necessity of a five-day BOD test? The BOD_5 of a waste water sample is 200 mg/L and its ultimate BOD is 400 mg/L. Find the reaction rate constant.
[(CO2)(Apply/IOCQ)]

(c)   Write a short note on 'Waste Water Treatment'.   *[(CO4)(Remember/LOCQ)]*

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

Group - E

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

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

(c)   Calculate the intensity of 101dB sound. (Reference intensity = 1×10^{-12} W/m^2).
[(CO2)(Apply/IOCQ)]

(d)   How does modern agricultural practice affect the soil pollution?
[(CO6)(Remember/LOCQ)]

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

9. (a)   If the intensity of sound source is increased to four times the earlier intensity, then find out the increases in intensity level.   *[(CO3)(Apply/IOCQ)]*

(b)   What is land pollution? Write down the effects of industrial solid waste on land
        pollution.   *[(CO4)(Remember/LOCQ)]*
(c)   What is noise threshold limit value? What are the drawbacks of dBA scale?
                                                                                [(CO5)(Remember/LOCQ)]
(d)   What is vermicomposting?   *[(CO6)(Remember/LOCQ)]*

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

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	75	25	0