

**ENVIRONMENTAL SCIENCES**  
**(EVSC 2016)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group - A**  
**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Which one of the following is likely to be present in photochemical smog?  
(a) Alcohol (b) Aldehyde (c) Ether (d) SO<sub>2</sub>.
- (ii) The environmental (protection) Act of India was introduced in  
(a) 1980 (b) 1985 (c) 1984 (d) 1986.
- (iii) Human ear frequency response is related to the network  
(a) dBA (b) dBB (c) dBC (d) None of these.
- (iv) The best method of disposal of clinical wastes  
(a) Open dumping (b) Sanitary land filling  
(c) Incineration (d) Composting.
- (v) Blue baby syndrome is related to  
(a) CO<sub>2</sub> (b) NO<sub>2</sub><sup>-</sup> (c) SO<sub>4</sub><sup>2-</sup> (d) PO<sub>4</sub><sup>3-</sup>.
- (vi) Montreal protocol is adopted to reduce  
(a) greenhouse gas emission (b) automobile emission  
(c) ozone layer depletion (d) deforestation.
- (vii) The maximum sustainable yield is obtained when the population is  
(a) at the carrying capacity (b) double of the carrying capacity  
(c) half of the carrying capacity (d) one fourth of the carrying capacity.
- (viii) Temporary hardness of water is due to the presence of  
(a) Cl<sup>-</sup> (b) SO<sub>4</sub><sup>2-</sup> (c) PO<sub>3</sub><sup>2-</sup> (d) HCO<sub>3</sub><sup>-</sup>.
- (ix) Which of the following is not an example of renewable energy source?  
(a) Solar power (b) Wind power  
(c) Hydropower (d) Mineral deposits.

- (x) Aircraft noise is measured through  
(a)  $L_{10}$  (18 hrs) index                      (b)  $L_{epn}$                       (c)  $L_{eq}$                       (d) None of these.

**Group - B**

2. (a) What do you mean by environmental factors?  
(b) Write short note on "Chernobyl Disaster".  
(c) What is green solvent? Give examples.  
(d) Following logistic growth of population, derive the expression for logistic growth rate constant  $r = (1/t^*) \ln (K/N_0 - 1)$ .  
(e) What do you mean by Environmental audit?
- 2 + 3 + 2 + 3 + 2 = 12**

3. (a) What are resources? In how many categories can resources be classified?  
(b) Write down the name of main sources of green energy. Explain about any one of them.  
(c) What is maximum sustainable yield? Prove that maximum sustainable yield following logistic growth of population is  $(dN/dt)_{max} = rK/4$ , the terms have their usual meaning.  
(d) What is sustainable development?
- (1 + 2) + (2 + 1) + (1 + 3) + 2 = 12**

**Group - C**

4. (a) What do you mean by ozone layer depletion? How did ozone hole in the Antarctica region form?  
(b) What are the differences between sulphurous smog and photochemical smog?  
(c) Show that for unit mass of air the temperature of the atmosphere falls by a rate  $r = -g/C_p$   
Where,  $r$  = rate of change of temperature with altitude;  $g$  = gravitational acceleration;  $C_p$  = specific heat at constant pressure.
- (2 + 3) + 3 + 4 = 12**
5. (a) How PAN is formed? Discuss.  
(b) What is greenhouse effect? Why are  $CO_2$  and water vapour ( $H_2O$ ) greenhouse gases, but  $N_2$  and  $O_2$  are not?  
(c) What are the three different criteria of atmospheric stability?  
(d) Deduce the chemical formula of CFC-11.
- 3 + (2 + 2) + 3 + 2 = 12**

**Group - D**

6. (a) Write down the sources of generation of Arsenic (As) in water and describe its biochemical effects.
- (b) What is the importance of dissolved oxygen (DO) as water quality parameter?
- (c) Describe different types of eutrophication in lakes. How can eutrophication be controlled?
- (d) Discuss briefly about "Trickling Filter" used in secondary treatment of waste water.

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

7. (a) What is chemical oxygen demand (COD)? Write down the differences between BOD and COD methods. The BOD of a waste water sample is determined to be 150 mg/L and the rate constant (k) is 0.3 day<sup>-1</sup>. Calculate the expected BOD<sub>5</sub> of the sample assuming temperature remains constant.
- (b) What do you mean by thermal pollution of water? Write down the effects of thermal pollution of water.
- (c) Why hard water cannot be used in laundries and boilers?

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

**Group - E**

8. (a) What is land pollution? Discuss the major sources of land pollution.
- (b) What do you mean by incineration?
- (c) Discuss the classification of anthropogenic noise according to their source.
- (d) What do you mean by human acoustics?
- (e) What are the effects of noise pollution on human beings?

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

9. (a) Calculate the intensity of 100 dB sounds.  
(Reference intensity =  $1 \times 10^{-12}$  w/m<sup>2</sup>)
- (b) Which equipment is used for the measurement of noise?
- (c) What are the advantages of recycling process?
- (d) Give a brief account of various types of hazardous wastes mentioning sources and examples?
- (e) Depict the working principle of modern sanitary landfill process for the safe disposal of solid waste.

$$2 + 1 + 2 + 3 + 4 = 12$$

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