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) Montreal Protocol is related to
(a) Land pollution (b) Water pollution
(c) Restriction in use of CFCs (d) Noise pollution.

(ii) Which of the following is not an example of renewable energy source?
(a) Solar power (b) Wind power
(c) Hydropower (d) Fossil fuels.

(iii) Value of Earth's ALBEDO is
(a) 0.21 (b) 0.11 (c) 0.31 (d) 0.41.

(iv) Anaemia can be caused due to the toxic effect of
(a) Hg (b) As (c) Cd (d) Pb.

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

(vi) The saturated value of Dissolved Oxygen is approximately
(a) 9 mg/L (b) 5 mg/L (c) 20 mg/L (d) 6 mg/L.

(vii) Which one of the following is true for a waste water sample?
(a) BOD>COD (b) COD>BOD
(c) BOD=COD (d) BOD=1/COD.

(viii) The main product of photochemical smog is
(a) PAN (b) O_3 (c) H_2SO_4 (d) NH_4.

(ix) The unit of intensity of sound is
(a) Watt/m^2 (b) N/m^2 (c) Decibel (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.

Group – B

2. (a) Following logistic growth of population, derive the expression for logistic growth rate constant $r = (1/t^*) \ln (K/N_0 - 1)$. (CO 3, IOCQ)
   (b) Give a brief account of room temperature ionic liquid. (CO 6, LOCQ)
   (c) What are the steps involved in an environmental impact assessment process? (CO 2, LOCQ)
   (d) What are the objectives of Environmental Protection Act of India? (CO 6, LOCQ)

4 + 3 + 2 + 3 = 12

3. (a) Classify inexhaustible resources providing suitable example. [CO 1, LOCQ]
   (b) 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? [CO 3, IOCQ]
   (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. [CO 3, IOCQ]
   (d) Write a note on sustainable development? [CO 6, LOCQ]

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

Group – C

4. (a) On the basis of global temperature model (including earth's ALBEDO), prove that the earth's surface temperature is -19 °C. [(CO4)(HOCQ)]
   (b) Write down the differences between photochemical smog and sulphurous smog. Give a brief account on "Tropospheric ozone." [(CO3)(IOCQ)]
   (c) Deduce the chemical formula of CFC-11. [(CO6)(HOCQ)]
   (d) Write short note on Cyclone separator. [(CO6)(LOCQ)]

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

5. (a) Define lapse rate. Classify lapse rate. Prove that, in case of adiabatic lapse rate of change of temperature decreases with altitude and is equal to -9.76 °C/km. [(CO5)(IOCQ)]
   (b) What are the major effects of global warming? [(CO1)(LOCQ)]
   (c) What are the effects of acid rain on aquatic life? [(CO2)(LOCQ)]

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

Group – D

6. (a) Write down the sources of generation of Arsenic (As) in water and describe its biochemical effects. [CO 3, LOCQ]
   (b) What is the importance of dissolved oxygen (DO) as water quality parameter? [CO 1, LOCQ]
   (c) Describe different types of Eutropication in lakes. How can Eutropication be controlled? [CO 1, LOCQ]

(d) Explain how chlorination disinfects drinking water and also mention its advantage and disadvantage. [CO 6, LOCQ]

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

7. (a) Considering biodegradation of organic matter as first order reaction show that $BOD_t = C_0(1-e^{-kt})$, where terms have their usual meanings. [CO 6, IOCQ]
   (b) A waste water sample has BOD_5 value 250mg/L at 20°C and ultimate BOD is 400 mg/L. Find out the BOD_5 at 40°C. [CO 6, HOCQ]
   (c) Describe using suitable diagram how an "Oxydation Pond" is used in secondary treatment of waste water. [CO 5, LOCQ]
   (d) Why hard water cannot be used in boilers? [CO 4, LOCQ]

3 + 3 + 4 + 2 = 12

Group – E

8. (a) Exemplify two hazardous wastes and mention their disposal. [(CO5)(LOCQ)]
   (b) What do you mean by solid waste management? How waste can be managed using reduce, reuse and recycling? [(CO6)(LOCQ)]
   (c) The sound of a Military Jet takeoff has the intensity of 140 dB. Is the sound tolerable to human ear? Justify your answer. (The reference intensity I_0 is 1 x 10^{-12} Wm^{-2}) [(CO4)(HOCQ)]
   (d) Describe various effects of noise pollution on human being. [(CO2)(LOCQ)]

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

9. (a) How does sanitary land filling differ from open dumping? [(CO4)(LOCQ)]
   (b) Discuss incineration process mentioning advantages and disadvantages. [(CO6)(LOCQ)]
   (c) What are the differences between noise and sound? [(CO5)(IOCQ)]
   (d) How much a sound of 2000dB is louder than a sound of 1000dB? [(CO5)(HOCQ)]

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

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	76.06%	18.75%	5.21%

Course Outcome (CO):

After the completion of the course students will be able to

CO1. Understand the natural environment and its relationships with human activities.

CO2. Characterize and analyze human impacts on the environment.

CO3. Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.

CO4. Educate engineers who can work in a multi-disciplinary environment to anticipate and address evolving challenges of the 21st century.

CO5. Understand and implement scientific research strategies, including collection, management, evaluation, and interpretation of environmental data.

CO6. 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

Department & Section	Submission Link
BT	https://classroom.google.com/c/NDA1MjI2MTA5NjQ1/a/NDc0ODQyMzkwMDQ2/details
CE - A	https://classroom.google.com/c/NDE3ODczOTA5OTcz/a/NDc0ODQyOTgzNzM1/details
CE - B	https://classroom.google.com/c/NDE3ODU2MjIwNjI1/a/MjI3ODkxMjMyNDg5/details
IT	https://classroom.google.com/c/NDE2MDIyODcxNzgy/a/NDc0ODQyOTgzMjM5/details
ME - A	https://classroom.google.com/c/NDA1MjI2MTExMjQ1/a/NDY3OTg1Mzg1MDQz/details
ME - B	https://classroom.google.com/c/MzExOTAwMjQ1MDI2/a/NDY3OTg5MjAzOTM4/details
BACKLOG	**Classroom link:** https://classroom.google.com/c/NDc0ODQxOTE0Mzc2?cjc=fmld6i7 **Exam link:** https://classroom.google.com/c/NDc0ODQxOTE0Mzc2/a/NDc0ODQxOTE0NTI1/details