

Name :

Roll No. :

Invigilator's Signature :

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2013

**BASIC ENVIRONMENTAL ENGINEERING AND
ELEMENTARY BIOLOGY**

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

i) Energy flow in the ecosystem is

- a) unidirectional
- b) cyclic
- c) unidirectional or cyclic
- d) cannot be said.

ii) The full form of ESP is

- a) Electrostatic precipitator
- b) Electrostatic producer
- c) Electron source precipitator
- d) none of these.

iii) 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.

iv) Air pollutant which reduces oxygen carrying capacity of hemoglobin is

- a) carbon monoxide
- b) ammonia
- c) hydrogen sulphide
- d) none of these.

v) The cause of eutrophication is

- a) increase of pathogens
- b) increase of BOD
- c) increase of algae's productivity
- d) increase of DO.

vi) Minamata disease occurs due to

- a) arsenic pollution
- b) lead pollution
- c) mercury pollution
- d) cadmium pollution.

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- vii) Montreal protocol is related to
- land pollution
 - noise pollution
 - production and use of CFCs
 - increase of population.
- viii) Blue baby syndrome is related to
- nitrate
 - sulphate
 - phosphate
 - carbonate.
- ix) In nephrotoxicity the targeted body part is
- kidney
 - liver
 - lungs
 - brain.
- x) Clinical wastes may be disposed of using the method
- composting
 - incineration
 - sanitary landfill
 - open dumping.

- xi) Railway traffic noise is measured by
- L_{10} (18 hour index)
 - L_{eqn}
 - L_{eq}
 - none of these.
- xii) The main constituent of London fog is
- carbon monoxide
 - hydrogen sulphide
 - carbon dioxide
 - oxides of sulphur.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- What are greenhouse effect and global warming ? Write down the different measures to control global warming. What is atmospheric radiation window ? $2 + 2 + 1$
- What is eutrophication ? How do you control eutrophication ? $2 + 3$
- Define biogeochemical cycle. Give a brief account of carbon cycle. $1 + 4$
- What is lapse rate ? Discuss the plume behaviour at different atmospheric conditions. $1 + 4$
- What do mean by environmental impact assessment ? How is it related to the setting up of a new process industry ? $2 + 3$

GROUP - C

(Long Answer Type Questions)

Answer any three of the following. $3 \times 15 = 45$

7. a) What is meant by hardness of water ?
b) What is Trickling filter ?
c) What are the methods of water softening ?
d) What do you mean by Biochemical Oxygen Demand (BOD) ?
e) Prove that $BOD_t = L_0 (1 - e^{-kt})$ where L_0 is the initial concentration of dissolved oxygen, k is the rate constant of degradation of organic waste.
 $2 + 2 + 5 + 2 + 4$
8. a) Show if population growth is logistic, then maximum sustainable yield is obtained when population is at half its carrying capacity i.e., $N = k/2$.
b) The increase in population from 1 million to 10 million took 200 years. For exponential growth at constant rate, find out the growth rate constant.
c) What is maximum mixing depth and ventilation coefficient ?
d) What is temperature inversion ?
e) Define food chain. $4 + 3 + 4 + 2 + 2$

9. a) What is SPM ? Mention any three control measures which can be taken to control these pollutants.
b) What are the harmful effects of depleted ozone layer ?
c) What is toxicity ? How do heavy metals interact with enzymes ?
d) How does sanitary landfill differ from open dumping ?

$3 + 4 + 4 + 4$

10. a) What is acid rain ? Write down the causes, reactions and effects of acid rain.
b) What is noise ? Explain the sources of noise pollution. What are the physiological impacts of noise pollution ? How can the noise be controlled at the source ?
c) What is solid waste ? Write a note on composting as method of solid waste. $4 + 6 + 5$

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11. Write short notes on any *three* of the following : $3 \times 5 = 15$

- a) Electrostatic precipitator
 - b) Cyclone separator
 - c) Environmental audit
 - d) Environmental Protection Law
 - e) Air Pollution Control Act.
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