2012

M.Sc. Part–II Examination

ENVIRONMENTAL SCIENCE

PAPER—IXA

Full Marks : 100

Time : 4 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Answer *Q. No. 1* and any *five* questions from the rest.

1. Answer any *ten* questions of the following : 2×10

(i) What are the conventional formula of representing the homologus series of saturated and unsaturated hydrocarbons.

(ii) State the 'Law of Mass Action'.

(iii) Why acidic solutions of calcium and magnesium ions are not precipitated out by passing H_2S ?

(iv) State the Laws governing the solubility of gases in water.

(v) Write down the chemical formula and structure of DDT.

(vi) Do you expect equal value of BOD and COD of easily biodegradable glucose compound ? — Explain.

(vii) Name two insecticides other than DDT commonly used.

(viii) What is Threshold Limit value (TLV) ?

(ix) What are environmental segments ?

(x) Define 'Environmental Lapse Rate'.

(xi) How O_3 is formed in stratosphere ?

(xii) What are the wavelength ranges of visible light ?

(xiii) What phenomenon is responsible for temperature maximum at the boundary of stratosphere and Mesosphere ?

(xiv) How can X-ray be produced ?

(xv) What is the principle of gravimetry analysis ?

(xvi) What are the major regions of Atmosphere ?

2. What are micro and macro nutrients in soil ? Why the study of soil is important ? What are the sources of soil pollution ? What is soil humus ? How does soil organic matter act as sink of toxic metals ? What are the roles of K and P in plant system ?

4+2+3+2+2+3

(Continued)

3. Define Eutrophication. What are the reasons behind this phenomenon ? Discuss the effects of eutrophication. How eutrophication can be controlled ?

   What is alkalinity of water ? How does it arise ? How it is measured in the Laboratory ?

   2+2+3+3+2+2+2

4. What is Photochemical Smog ? What are the units of measurements of air pollutants ? Outline the types and sources of air pollutants. Briefly discuss the methods of removal of NO_x in automobile emissions.

   3+3+4+6

5. State Lambert–Beers Law. What is chromatography ? What are the differences between GC and HPLC ? Outline the principles of the following instruments.

   (a) Electroforesis;

   (b) X-ray fluorescence;

   (c) X-ray diffraction.

   3+2+2+(3×3)

6. Briefly discuss the possible sources and biochemical effects of (i) CO; (ii) O_3; (iii) PAN and (iv) MIC.

   (2+2)×4

7. What are the sources of pesticides in water ? Why pesticides are harmful to human beings ? Name two carcinogen present in air. What are the sources of arsenic in ground water ? Name other ecofriendly methods for pest controlling instead of chemical pesticides.

   3+3+2+3+5

8. Define Gibb's free energy. What are the criteria of spontaneous chemical reactions ?

   At 1 atm and 27°C, will be vaporisation of liquid water be spontaneous ? Given ΔH = 9710 cal, ΔS = 26 eu state Lechatelier Principle.

   What will be pH and pOH values of 1(M) acid solutions ?

   3+3+4+3+3

9. In BOD estimation why stoppered bottle is used ? Why wastewater samples are diluted ?

   Explain the reason behind the incubation of samples in dark place at 20°C.

   What are the differences between aerobic and an aerobic biodegradation ? Why and when seeding of wastewater samples are necessary ?

   2+3+3+5+3

10. What are coagulation and sedimentation ? What are mechanisms behind these phenomena ? In which type of water treatment, these conditions are adopted ? Mention the characteristics of filter used in this treatment. How is the filter regenerated ? Name two common floculants used in water treatment.

    2+2+4+1+3+2+2

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