

**2016**

**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 : 10×2

- (i) What is Stoichiometry ?
- (ii) What is the full form of ROS ?
- (iii) What is Photochemical Smog ?
- (iv) State Bragg's Law ?
- (v) Name two chemical substances that causes ozone hole.
- (vi) Mention two physiological effect of arsenic.
- (vii) Name two buffer system found in living body.

*(Turn Over)*

- (viii) What is molar extension co-efficient ?
- (ix) Name two detector system used in H.P.L.C.
- (x) Name two microorganisms involved in Phosphorus cycle.
- (xi) Give Lewis definition of acid.
- (xii) What is chemical equilibrium ?
- (xiii) What is meant by common ion effect ?
- (xiv) What is sedimentation co-efficient ?
- (xv) Write down two utility of measuring D.O.

2. Write explanatory notes on : 4×4

- (a) Ecological effects of Pesticides.
- (b) Noise Pollution.
- (c) Organic Pollutants.
- (d) Lead Pollution.

3. Write down the principle & applications of (any two) :

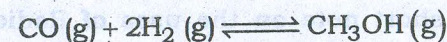
8×2

- (a) G.L.C.
- (b) X-ray defraction.
- (c) Spectrophotometer.

4. What is Soil Profile ? Mention the characteristics of major soil profiles. What are the biotic and abiotic components of soil. Discuss the role of NPK in enhancing soil fertility.

2+4+4+6

5. (a) Write short notes on chemical potential of a system.
- (b) What is meant by radio active disintegration. Mention the effect of radioactive wasters on ecosystem.
- (c) There is an equilibrium between carbon monoxide and methanol at 500°K. The equilibrium follow the following reaction.



The equilibrium concentrations are  $[\text{CO}] = 0.0911(\text{M})$  ;  
 $[\text{H}_2] = 0.08222 (\text{M})$  and  $[\text{CH}_3\text{OH}] = 0.00892 (\text{M})$ .

What is the value of the equilibrium constant ? Does the equilibrium favour reactants or product ?

5+(2+3)+6

6. (a) State the Lambert-Beer's Law and obtain the integrated expression of the law.

(b) How do you obtain unknown concentration of a coloured organic compound using the above law.

(c) Write down the working principle of Flame Photometry and give one application of it. (2+3)+5+(4+2)

7. (a) What is meant by Gibbs energy ? Why is it called Gibbs free energy ?

(b) What are difference between Exergonic and Endergonic reaction ?

(c) Define acid and base according to Lewis definition. What type of microorganism will grow near the acid manufacturing company. How does lung and kidney regulate the pH of blood ? (2+2)+4+(2+2+4)

8. (a) What is meant by solubility product of a sparingly soluble salt? The  $K_{sp}$  of AgCl is  $1.8 \times 10^{-10}$ .  $Ag^+$  and  $Cl^-$  are both in solution and in equilibrium with AgCl. What is the  $[Ag^+]$ , if  $[Cl^-] = 0.02M$ .
- (b) How does the behaviour of carbonate in sea water differs from that in fresh water.
- (c) Write a short note on the uses of Radionuclides in Medicine and Research? (2+2)+4+8
9. (a) "Oxygen plays a key role in the atmosphere, while ozone, in the stratosphere"— Explain.
- (b) How would you broadly divide the major regions of the atmosphere? State their respective altitudes and temperature range? What are the important chemical component in each region?
- (c) Write down the chemical processes for the formation of inorganic particulate matter in the atmosphere. 4+(3+2+3)+4
10. (a) "Discuss the process of treatment of raw waste water in factories and municipalities.
- (b) Write a note on the process of continuous filtration to remove suspended solids and liquids in water.
- (c) Write short notes on (i) BOD & (ii) COD. 5+5+(3+3)