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M.Sc. DEGREE I SEMESTER EXAMINATION IN
ENVIRONMENTAL TECHNOLOGY
MARCH 2002

CHEMISTRY OF THE ENVIRONMENT

Time : 3 Hours Maximum Marks: 50

PART - A

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 2 = 10)

I. 1. Name the major natural and anthropogenic sources of atmospheric NO_x. Give the corresponding chemical reactions.
2. Name the three most abundant elements on the crust of the earth in the order of decreasing abundance. Mention the chemical forms in which they exist.
3. A sample of water from a pond contains 6.4 mg/L of O_2. Express the concentration in moles per litre and oxidant equivalents per litre. Express the results with appropriate number of significant figures.
4. On the basis of molecular arrangement in the condensed medium explain the anomalous expansion of water.
5. A contaminated water sample from a radioactive materials processing laboratory gave 4800 counts per mintue when received at the laboratory. After exactly one year the same sample gave 1600 counts per minute. Calculate the half-life of the active nuclide.
6. Give the general structural formulae of ABS and LAS. Why is LAS more environment-friendly than ABS?

PART - B

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 3 = 15)

II. Give plausible mechanisms by which ODS destroy ozone in the stratosphere.

III. Using suitable examples distinguish between congruent and incongruent dissolution of minerals.

(Turn Over)

IV. A carbonated sample of water contains 120 mg/L of CO_2. Calculate its pH. (pK_{a1} of $H_2CO_3 = 6.35$).

V. With the help of necessary diagrams explain the geo-biochemical P cycle.

VI. Distinguish the effect of alpha, beta and gamma radiation on gases. Give the basis of observed differences.

VII. Name any two polynuclear aromatic hydrocarbons. Why are these compounds considered as environmental threats?

PART - C

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 5 = 25)

VIII. Describe the natural and anthropogenic conditions that favour the formation of oxidizing smog. Name the oxidants commonly found in the smog.

IX. Define the term *soil horizon*. Briefly describe the fate of organic detritus in the soil horizons.

X. Sketch the pH-dependent species distribution diagram for CO_2 in water. Mark points corresponding to pK_{a1} and pK_{a2} for carbonic acid.

XI. What are the major sources of mercury in the anthrosphere? Outline the mobilization pathways of mercury in the hydrosphere.

XII.(a) How is Co-60 nuclide produced? What is its application in medicine?
(b) Name any one radioisotope used in hydrological prospecting. What are its merits?

XIII.(a) "Introduction of DDT was a need of the early forties." Can we justify this statement?
(b) Name any two halogenated alicyclic pesticides.
(c) Writedown the structure of any two degradation-products of DDT.

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