# U.G. 1st Semester Examination - 2020

## ENVIRONMENTAL SCIENCE

### [HONOURS]

**Course Code : ENVS-H-CC-T-2**

**(Environmental Chemistry & Environmental Physics)**

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

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

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

1. Answer any **five** of the following: 2×5=10

   a) What is the relationship between frequency and wavelength of an electromagnetic radiation?

   b) State Darcy's law and write its mathematical expression.

   c) Why is $NO_2$ considered a more significant species than $SO_2$ in atmospheric chemical reactions?

   d) What is biomethylation of mercury?

   e) State which one of the following has the higher entropy and why: 1 mol of $NH_3(g)$ or 1 mol of He(g) at 25°C.

*[Turn over]*

   f) Define macro-nutrients in soil with examples.

   g) Differentiate between centripetal force and centrifugal force.

   h) Which functional groups are present in phenol and vinegar?

2. Write short notes on any **two** of the following: 5×2=10

   a) Lead : Its sources, biochemical effects and antidote

   b) Atmospheric scattering of light

   c) Nitrogen cycling in soil

   d) Biodegradable and persistent pesticides in the environment

3. Answer any **two** of the following: 10×2=20

   a) Discuss the chemistry of formation of acid rain. Why ozone depletion occurs mainly over Antarctica during spring? Illustrate how PAN is formed in a smog-producing chain reaction. What do you mean by ventilation coefficient? 3+2+3+2=10

   b) Show a soil profile indicating soil horizons with a neat sketch. Explain the ion-exchange reactions in soil. Describe the method for the

estimation of dissolved oxygen (DO) or total organic carbon (TOC) in water sample.

3+3+4=10

c) i) State Beer-Lambert Iaw. Calculate the concentration of the substance in solution having the absorbance value of 1.0, placed in a spectrophotometric cell of 2.0 cm path length (Given: the molar absorptivity of the compound is $2\times10^4 Lmol^{-1}cm^{-1}$.

ii) Explain in brief the types, components and efficiency of wind turbines.

(2+3)+5=10

d) Define normality. Calculate the normality of 2.39 gm of NaOH in 1.25 L of solution. Fluorine is the most electronegative element but its electron affinity is less than that of chlorine. Why? What are the different thermodynamic systems in our environment?

2+3+2+3=10

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