

**Department of Agricultural and Food Engineering  
Indian Institute of Technology, Kharagpur**

**Date:** 25-02-11 AN    **Time:** 2 hour    **Full Marks:** 30    **No. of Students:** 17

**Mid-Spring Semester Exam 2011 1<sup>st</sup> Year M. Tech (LWRE)**

**AG 60154: NPS Pollution and Management**

**Answer All Questions. Make appropriate assumptions wherever necessary**

**Q. 1.** What do you mean by the order of a chemical reaction? Describe briefly the reactions of different orders (zero order to 3<sup>rd</sup> order) with governing equations and examples.

(1+4)

OR

Describe briefly the principles of Ion Chromatography, operating procedure and use of an Ion Chromatograph for analyzing water quality parameters

(1+4)

**Q. 2.** Define the Primary, Secondary and Tertiary treatments. Describe briefly the primary and secondary treatment techniques used for treating waste water in urban areas.

(1+4)

**Q. 3.** Name 10 important water quality parameters with their desirable and permissible limits. Describe the analysis procedure for any TWO of them.

(2+4)

**Q. 4.** Describe briefly the components and processes involved in a Water Treatment Plant

(4)

**Q.5.** The EC of top 60cm soil is required to be reduced from 20 mmhos/cm to 8 mmhos/cm. If the desired equilibrium electrical conductivity (EC<sub>eq</sub>) is 3 mmhos/cm, evaporation rate is 1 cm/day and water required to raise the moisture content of the top 60cm soil is 20 cm, find the quantum of water needed for leaching.

(5)

**Q.6.** The half-life of Krypton is 10.6 years. How long will it take for 99 % of Kr<sup>85</sup> to disintegrate?

(5)