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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION - 2016

M.Tech I Semester

COURSE CODE: 14M31CE212 **MAX. MARKS: 35**

COURSE NAME: CONTAMINANT TRANSPORT

COURSE CREDITS: 03 **MAX. TIME: 2 Hr**

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1.a) Distinguish between "Direct" and "Indirect" photodegradation. Explain the two processes by giving examples **[2.5 Marks]**

b) What is the light intensity at 1-m depth in a lake, given an intensity of 3000μE/ (m^2.sec) just beneath the lake's surface and an extinction coefficient (base e) of 0.6/m? If an aquatic plant has a light compensation point (the light intensity at which respiration rate equals photosynthetic rate) of 150 μE/ (m^2.sec), what is the maximum depth at which the plant may be expected to grow? **[2.5 Marks]**

Q2.a) Discuss why hydrolysis reaction are important and significant processes in the aquatic environment **[2.5 Marks]**

b) What are the important parameters that affect the rates of hydrolysis in the environment? **[2.5 Marks]**

Q3.a) Define "Retardation Factor". Derive the relationship between retardation factor, distribution coefficient, bulk density and porosity. **[1.5 +2.0 Marks]**

b) The porous material of an aquifer has a bulk density of 2g/cm3 and contains 0.5% organic carbon. Estimate the retardation factor for naphthalene ($C_{10}H_8$). If the porosity of the aquifer is 0.24, the hydraulic conductivity is 10^{-3} cm/sec, and the hydraulic gradient is 0.001, how fast will a plume of naphthalene advance in the aquifer? $\log K_{oc} = 0.937 \log K_{ow} - 0.006$; $\log K_{ow} = 3.36$ **[04 Marks]**

Q4.a) What are the dry deposition mechanisms by which physical removal of particles takes place in atmosphere? Discuss on any one mechanism. **[2.5 Marks]**

b) An underground nuclear bomb test results in deposition of particles into the atmosphere at a height of 1.5km over the site. If the soil particles have a density of 2.3 g/cm^3, and the wind speed is 1.5 m/sec, what would be the maximum size of the particles that could be transported beyond the border of the test site, which is 200km downwind? Assume dynamic viscosity of air = 1.83 x 10^{-4} g/(cm.sec) **[2.5 Marks]**

Q5.a) What are the two major differences between settling of particles in water and air? **[02 Marks]**

b) Estimate the dry deposition rate of nitric acid (HNO_3) aerosol on a forest, if atmospheric concentration of HNO_3 is $5\mu g/m^3$. Assume a deposition velocity of 1 cm/sec. **[02 Marks]**

c) What should be the maximum radii of a particle in air to which stokes's law is applicable **[01 Marks]**

Q6.a) How particulate chemicals are removed from atmosphere through wet deposition processes. **[02 Marks]**

b) With the help of a neat figure, explain the working of a wet-dry atmospheric deposition collector **[03 Marks]**

c) Write a note on Reactive Oxygen Species (ROS) **[2.5 Marks]**