B. E. (Civil) Part – IV 8th Semester Examination, May 2013

Time: 3 hours Full Marks: 70

ENVIRONMENTAL GEOTECHNICS (CE – 804/7)

Attempt question **No. 1** and any **Five** from the rest

Q. 1. Write short notes on any ***Five*** from the following: 5@4 = 20

(a) DTA test
(b) Advection, dispersion and chemical reactions
(c) Leachate collection and removal system
(d) Ignitability, Corrosivity and Reactivity of hazardous wastes
(e) Fick's first law
(f) Forces between clay particles
(g) Blast furnace slag

Q. 2. (a)Discuss any three clay mineral structures highlighting their impact on engineering properties of soil.
(b) What do you mean by isomorphous substitution?

7.5+2.5 = 10

Q. 3 (a) Write down the considerations of soil decontamination.
(b) Discuss any two decontamination techniques from the followings:
(i) Electrokinetic remediation, (ii) Solidification and stabilization and (iii) Treatment walls

3+2@3.5=10

Q. 4. (a) Derive the following one dimensional contaminant transport model:

$$R\frac{\partial c}{\partial t} = D\frac{\partial^2 C}{\partial z^2} - v_s\frac{\partial C}{\partial z}$$

The symbols are used with their usual meaning.
(b) Define distribution coefficient K_d.

8+2 = 10

Q. 5. (a) Explain laboratory column test to determine D and K_d.
(b) Compute the life span of clay liner for the following specifications:

Thickness of the clay liner	= 1.5 m
Hydraulic conductivity of the liner	= 5×10^{-10} m/s
Porosity of the liner	= 0.5
Maximum leachate head over the liner	= 0.4 m

Consider advection only.

4+6=10

Q. 6. Explain the following aspects related to the soil exploration of contaminated site/ waste disposal site:
(a) Health and safety
(b) Contaminant Source Investigation
(c) Reporting
(d) Parameters for contaminant flow

4@2.5=10

contd.

Q. 7. (a) Write down the various types of walls generally used for pollution migration control based on method of construction.
(b) How the effectiveness of slurry wall can be achieved?
4+6= 10

Q. 8. (a) How the critical depth (Hcr) of slurry –filled trench can be determined in clayey soil deposit?
(b) Enumerate the specifications of a waste containment liner
(c)Enumerate different types of cover/lining systems
3+3+4=10

Q. 9. (a) Explain the hydrologic model for computation of leachate
(b) Determine the spacing of pipes to be laid over a clay liner to maintain maximum accumulation of leachate over the drainage layer as 50 cm, in a proposed solid waste landfill site. The hydraulic conductivity of the drainage layer is 5.5×10^{-5} m/s. The leachate generation rate at rainy season may be assumed as 0.88 m^3/m^2/month. Assume that there is no slope between the collection pipes.
4+6 = 10

Q. 10. (a) Enumerate the use of fly ash and blast furnace slag
(b) Explain the steps to be followed for nuclear and medical waste management
3+2@3.5 = 10