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National Institute of Technology of Management, Lucknow

Geo-environmental Engineering (RCE-053)

Tutorial Assignment Sheet
(Session 2018-19)

Unit-I

1. Explain the importance and scope of geo-environmental engineering.
2. Discuss the multiphase behavior of soil. With suitable examples
3. Why soil becomes important in geo-environmental engineering?
4. Discuss the multidisciplinary nature of geo-environmental engineering.
5. What are the different components of soil-water potential?
6. Compare saturated and unsaturated state of soil
7. Explain important features of water retention curve
8. Discuss soil-water diffusivity.
9. What is the difference between retardation and retention of contaminants?
10. Explain the significance of soil sorption behavior in waste management?

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Unit-II

1. What are clay minerals? Summarize important properties of clay minerals.
2. What is the major difference between the three clay minerals: Kaolinite, Illite and montmorillonite.
3. What are the important mechanisms of soil-water interaction?
4. Explain the formation of diffused double layer.
5. What are the important assumptions for formulation DDL theory?
6. Discuss in brief, Gouy Chapman DDL model.
7. Explain the significance of cation exchange capacity and method of its determination.
8. How does CEC and SSA influence reactivity of soil?
9. Define volumetric water content? How does the volumetric water content influence the flow properties of a soil medium?
10. Derive relationship between volumetric and gravimetric water content.

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Unit-III

1. What is the difference between a natural attenuation landfill and an engineered landfill.
2. Discuss in detail the multicriteria method for landfill site selection.
3. What is the importance of waste characterization?
4. What are the factors influencing leachate quality and quantity?
5. How can you estimate leachate and gas generation rate?
6. Explain in steps the design philosophy of waste containment liner system.
7. What are the major differences between physisorption and chemisorption?
8. Explain the batch method for establishing sorption characteristics of the soil-contaminant system.
9. Explain the physical significance of sorption characteristics and its importance in contaminant transport modeling.
10. What are the different isotherms used for establishing sorption characteristics?

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Unit IV

1. What are the important points to be kept in mind for contamination assessment?
2. What are the processes involved in the planning of contaminated site remediation?
3. What are the important data required for planning contaminated site remediation?
4. Discuss the important physico-chemical methods for performing contaminated soil remediation.
5. Prepare a scheme for the design of permeable reactive barrier.
6. Based on the literature, explain how to plan and design electro-kinetic remediation.
7. Discuss case histories related to contaminated site remediation and identify the most popular method.
8. What are the different contaminant transport phenomena?
9. What is diffusion and when it is expected to dominate contaminant transport phenomena?
10. What is retardation coefficient and how it is helpful in determining ionic velocity?

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Unit-V

1. What are the different single and sequential procedures for extraction of contaminants from soil?
2. What are the uses of measuring electrical property of soil?
3. What is the difference between calibration and validation procedure?
4. Discuss about the dielectric and electrical properties of soil-water-contaminant system and its important features.
5. Explain steady state and transient methods for measuring thermal properties of soil.
6. What are the factors influencing thermal and electrical property of soil?
7. What are the various methods used for measuring volumetric water content of soil?
8. What are the different modeling approaches in geotechnical and geoenvironmental engineering? Discuss the relative merits and demerits of each method.
9. What are the different geophysical methods for subsurface investigation/
10. Suggest and justify a less time consuming procedure in the lab for obtaining advective-dispersive contaminant transport parameters for a compacted bentonite soil layer
