May-2016

Total Pages—4

(Set-R_1)

M.Tech - 2nd(CE-ESE/GTE)
Environmental Geotechnics

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 which is compulsory and any five from the rest

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

   (*a*) What is the scope in environmental geotechnique ?

   (*b*) What are the major sources of subsurface contamination ?

   (*c*) What are the functions of a cover system ?

   (*d*) What is bioremediation ?

   (*e*) Define biosparging and bioventing.

(*Turn Over*)

(*f*) Write down different forms of waste with example.

(*g*) What are the different types of impoundments show with neat sketch ?

(*h*) What are the benefits of bioreactor landfill ?

(*i*) What are the various methods available for removal of heavy metals in soils ?

(*j*) What are the techniques used for bio-remediation of contaminated soils ?

2. (*a*) Explain in detail the various contaminant retention and transport mechanisms in soil. 6

(*b*) Explain about the components of a solid waste landfill with neat sketch. 4

3. (*a*) Explain the factors that play an important role in design of a ash containment system. 5

(*b*) Explain about the geotechnical criteria for the selection of waste disposal sites. 5

4. (*a*) Explain the methods of raising in stages of an ash pond with neat sketch. 6

(*b*) What are the various methods of treatment procedure for decontamination of a contaminated site ? 4

5. (*a*) Explain stability analysis of Landfills with neat sketch. 5

(*b*) Find the slope of the cover which will remain stable against sliding of soil over the geomembrane with a safety factor of 1·5, given that the angle of interface shearing resistance between geomembrane and drainage layer is 20 degrees. For Length of 30 m, unit weight of top soil and drainage soil of 18kN/m^3, density and thickness of HDPE are 9·4 kN/m^3 and 1·5 mm respectively. Angle of geomembrane clay interface resistance of 12 degrees with negligible adhesion; determine the tension in the geomembrane. Thickness of top soil and drainage layer are 0·7 m and 0·4 m respectively. 5

6. (*a*) What are the different types of bioreactor landfill ? Explain with neat sketch. 5

(*b*) Explain about the liner and cover system. 5

7. (*a*) What are the processes involved in the planning of contaminated site remediation ? 5

(*b*) How does soil washing work ? Explain the working process with help of a flowchart ? 5

8. (*a*) Explain the engineering properties of waste with its range. 5

(*b*) With the help of a neat sketch explain the landfill construction and operation method. 5
