

B.E. (Civil) Part-IV 8th Semester Examinations, April-May, 2013
PRINCIPLES OF SLOPE STABILITY COMPUTATIONS (CE-805/8)
(Elective-III)

Time: 2 hours

Full Marks: 35

Answer Q. Np. 1 and any three questions from the rest

- 1.(a) Enumerate various causes of failure of slopes.
(b) Discuss the necessity for rigorous slope stability computations vis-a-vis safety and economy.
(c) Show a typical failure surface in an infinite slope and explain the reasons for such a shape.
(d) Discuss the modes of failure of a man-made slope and also explain the situations in which each type of failure occurs. (3x2+5)

- 2.(a) Derive an expression for factor of safety of an 'infinite slope' subjected to steady seepage parallel to the slope.
(b) Can an infinite slope have an angle of inclination greater than the angle of internal friction of the slope material? (5+3)

- 3.(a) In the limit equilibrium approach of slope stability analysis, show, with the help of a neat sketch, a simple slope with a given slip surface and the sliding mass sub-divided into n number of vertical slices.
(b) Pick out a typical slice (ith slice) and show the complete system of forces acting on it. Make a list of unknowns and equations and discuss whether the problem is statically determinate. If not, what is the degree of indeterminacy? What assumptions are usually made to deal with the indeterminacy? (3+5)

- 4.(a) For all 'approximate methods' of slices, derive a general expression for factor of safety.
(b) Using the expression derived above obtain the expression for factor of safety based on the Ordinary Method of Slices. (4+4)

- 5.(a) For a finite slope, define the critical slip surface and the associated minimum factor of safety and generally discuss the procedure for obtaining them.
(b) What are the guidelines available for the location of critical slip circles? (4+4)

- 6.(a) Derive an expression for factor of safety using the simplified Bishop method, clearly stating the assumptions involved.
(b) How accurate is the solution obtained when compared to some of the rigorous methods of slices? (6+2)

- 7.(a) Derive an expression for the pseudo-static factor of safety of a homogeneous slope subjected to earthquake loading.
(b) Discuss the merits and demerits of the pseudo-static approach. 5+3)