(3) TE-sem-VI-old-civil
QE-II
14/12/15

(OLD COURSE) **QP Code : 2040**
(3 Hours) **[Total Marks : 100**

(1) Question No. 1 is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume **suitable** data wherever necessary.
(4) **Numbers** to the **right** indicate **full** marks.

1. (a) Explain the failure surfaces in finite slopes. 5
   (b) Explain pile foundations on the basis of load transfer and method of installation. 5
   (c) What is a general, local and punching shear failure of shallow foundation? 5
   (d) Differentiate between earth pressure at rest, active and passive earth pressure. 5
2. (a) A retaining wall 4 m in height has a smooth vertical surface. The backfill has a horizontal levelled surface with the top of the retaining wall. The unit weight of backfill is 18 kN/m^3, shearing angle of resistance of 30 degrees and cohesion zero. A uniformly distributed surcharge load of 40 kN/m^2 intensity is acting on the back fill. (i) Calculate the magnitude and point of application of active thrust per metre length of the retaining wall. (ii) If the water table rises behind the wall to a height of 2 m above the base of the retaining wall what will be the value of active earth pressure and point of application of active thrust? 10
   (b) Explain the difference between Rankine's and Coulomb's earth pressure theories and explain the methods of analysis in both the theories. 10
3. (a) Explain ditch conduit and positive projecting conduit. 10
   (b) A cantilever type sheet pile having a height of 6 m above the dredge line supports the backfill of sand having an angle of internal friction of 30° and unit weight of sand is 18 kN/m^3. Water table is at 3 m above dredge line. Find the depth of embedment for the sheet pile if the soil below the dredge line is clay having cohesion of 50 kN/m^2. The saturated unit weight of both sand and clay below water table is 20 kN/m^3. 10
4. (a) Explain the factors affecting the bearing capacity of soil. 10
   (b) A rectangular footing has a size of 2 m by 3 m and transmits a load of a column at a depth of 1.5 m. Determine the safe load which the footing can carry at a factor of safety of 3 against shear failure using Terzaghi's method. Consider unit weight of soil = 18 kN/m^3, effective angle of internal friction = 30°, effective cohesion = 10 kN/m^2, N_c = 37.2, N_q = 22.5, N_γ = 19.7 10
5. (a) A concrete pile 350 mm diameter is driven into dense sand for a depth of 15 m. Estimate (i) the safe load for the pile and (ii) safe load if the water table is close to ground surface. Consider following properties for the sand: angle of internal friction = 30°, unit weight = 20 kN/m^3, coefficient of friction between sand and pile = 22.5, coefficient of earth pressure = 1.5, N_q = 16.5 Factor of safety = 2.5 10
   (b) How the bearing capacity of a group of piles is estimated in sand and clay. 10

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6. (a) The slope is made of sandy clay with an effective angle of internal friction = 20°, effective cohesion = 25 kN/m^2, dry unit weight of soil = 16 kN/m^3, saturated unit weight of soil = 20 kN/m^3. Find the critical height of an infinite slope having a slope angle of 30° for the following cases (i) the soil is dry (ii) the water seeps parallel to the surface of the slope and (iii) slope is submerged. 10

(b) Explain pile load test and determination of allowable load from the test. 10

7. (a) Determine the loads in the three struts supporting an open cut. The depth of open cut is 8m and width is 4 m. The struts are located at 1 m, 4 m and 7 m from the ground level. The centre to centre spacing of the struts along the length of the cut is 3 m. The soil is sand having unit weight of 18.5 kN/m^3 and angle of internal friction = 38°. 10

(b) Explain the Mechanically stabilized retaining wall construction and stability check. 10