M.E. Second Semester (Civil (Structural Engg.)) (New - CGS)

13095 : Elective - Substructures And Foundation Design : 2 SFSE 5

P. Pages : 1

Time : Four Hours

AU - 3453

Max. Marks : 80

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0960

Notes : 1. Assume suitable data wherever necessary.
2. Solve **any four** questions.

1. Design a combined trapezoidal footing for two column A and B spaced between 6 m c/c. column A is 350 x 350 mm in size and transmit a load of 500 kN. Column B is 400 m x 400 m in size and carries a load of 700 kN. The max. length of footing is restricted to 7 m only. The SBC of soil may be taken as $120 \, kN/m^3$ use M 25 & Fe 500. **20**

2. a) Explain the following types of abutments **6**
   i) Gravity
   ii) Stub
   iii) Counter fort

   b) Design counter fort retaining wall for - **14**
   1) Ht of wall above ground = 7 m.
   2) Depth of foundation = 1.5 m
   3) SBC of soil = $150 \, kN/m^2$.
   4) Unit wt of earth fill = $18 \, kN/m^3$
   5) Surcharge angle = 18°
   6) Angle of internal friction = 30°
   7) Spacing between counter forts = 2 m
   8) Coefficient of friction between soil & concrete = 0.55

3. Derive expression for Top slope, deflection, SF & BM for a beam having infinite length and resting on elastic foundation subjected to UDL for length. **20**

4. Design a pile of a pile group of two piles 2 m c/c apart carrying column load subjected to 2000 kN. The pile is to be driven into a hard strata available at 8 m below GL. Assume insertion of pile into hard strata as 800 mm. Use M 20 concrete & Fe 415 steel. Design the pile & pile cap. **20**

5. Design an isolated footing for a column 300 x 500 mm reinforced with 6 - 20 mm bars with Fe 415 & M 25 conc. It is subjected to factored. Axial load P_u = 1000 kN & factored uniaxial moment M_{ux} = 100 kN – m with respect to major axis at the column base. Assume moment is reversible. Take SBC = $200 \, kN/m^2$ at a depth of 1.25 m. Take M 20 & Fe 415 for footing. **20**

6. Explain :
   i) Design criteria for block type machine foundation? **7**
   ii) Classification of pile? **6**
   iii) Pile group, efficiency & factors affecting? **7**

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