

M.Tech. Structural Engineering & Construction (CBCS Pattern) Semester - II
PSES23 - Design of Substructures

P. Pages : 2

Time : Three Hours



GUG/S/23/11015

Max. Marks : 70

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. I.S.I. Hand Book for structural steel section, I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 may be consulted.
 6. Solve **any five**.

1. Two column having cross-section of 250 x 250 mm and 300 x 300 mm are loaded with 300kN and 500kN respectively. The c/c distance between columns is 4 m and the bearing capacity of soil is 100kN/m^2 . Design a rectangular combined footing without beam. **14**
2. Design a raft foundation for the layout of columns shown in Figure 2. All columns are of square shape of size 40 x 40 cm. $\text{ADSP} = 80\text{kN/m}^3$. Use M 15 concrete and Fe415 steel. Assume 10% as the load of raft and soil above. **14**

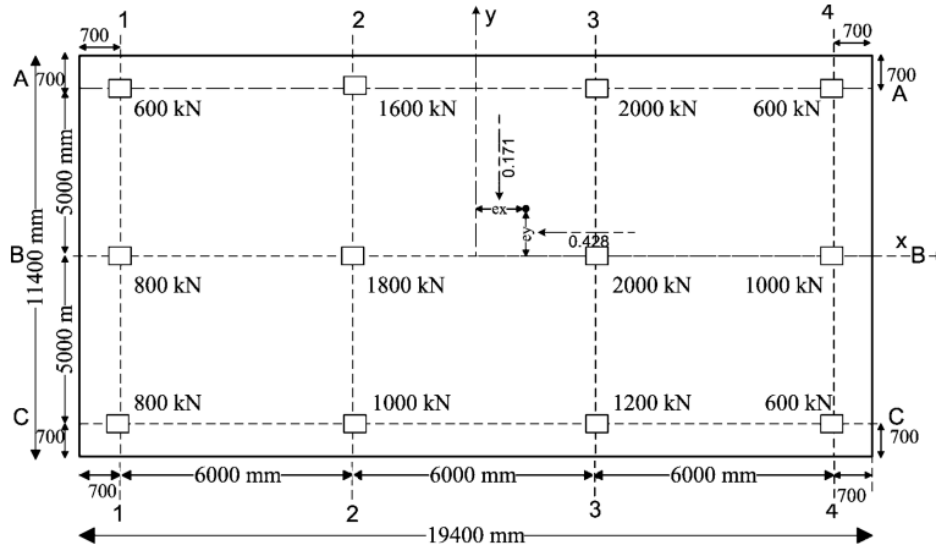


Figure 2

3. Design a Pile foundation where concrete pile is to driven into medium dense to dense sand. Coefficient of Cateral earth pressure is 0.95 and f_{os} is 2. **14**

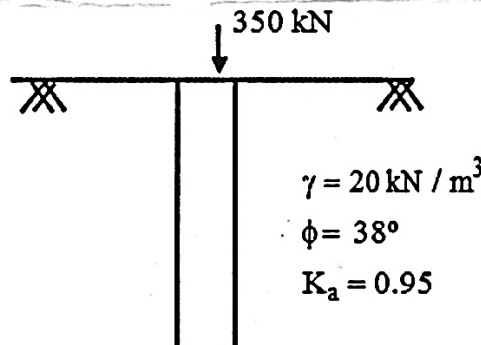


Figure 3

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| 4. | Explain analysis and design of simple machine foundation. | 14 |
| 5. | Explain the beam on elastic foundation. Derive the differential equation beam on elastic foundation. | 14 |
| 6. | Design a cantilever retaining wall to retain earth for a height of 4m. The backfill is horizontal. The density of soil is 18kN/m^3 . Safe bearing capacity of soil is 200kN/m^2 . Take the coefficient of friction between concrete and soil as 0.6. The angle of repose of earth is 30° . Use M20 concrete and Fe500 steel. | 14 |
