M.Tech. Structural Engineering & Construction (C.B.C.S. and Old C.B.S. Pattern) Sem-II

PSES23 - Design of Substructures

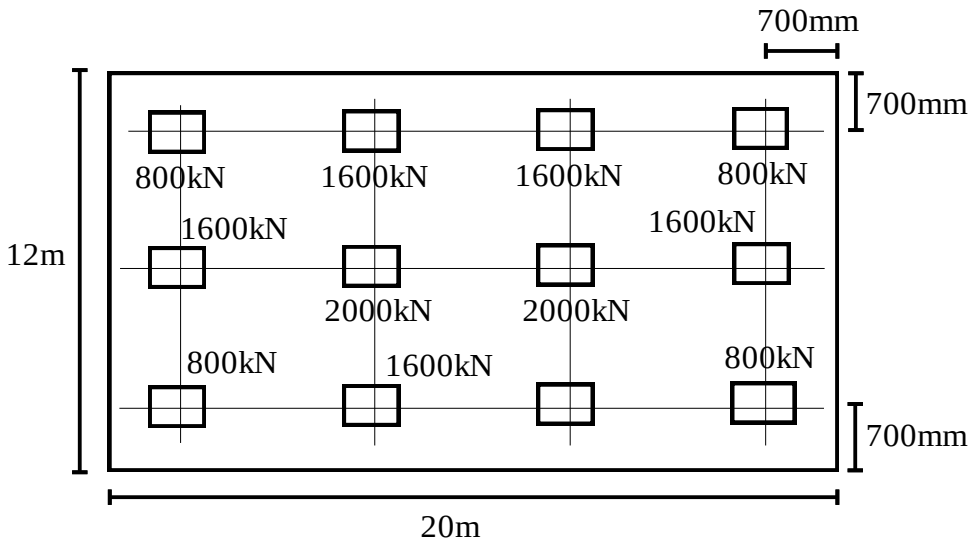
P. Pages : 2 **GUG/S/19/11015**

Time : Three Hours * 2 9 7 7 * Max. Marks : 70

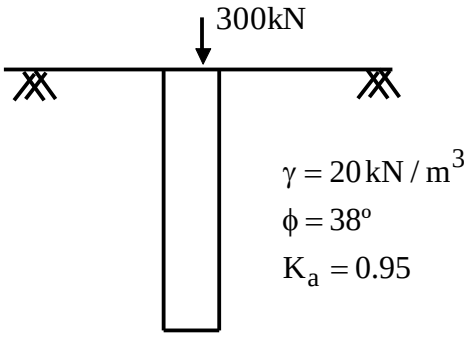
Notes :
1. All questions carry equal marks.
2. Answer **all** questions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Retain the construction lines.
6. Illustrate your answers wherever necessary with the help of neat sketches.
7. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
8. I.S.I. Hand Book for structural steel sections, I.S. Code 8000/1962 or 1964, I.S. 456 (Revised), I.S. 875 may be consulted.
9. Use of D. A. Law's "Pocket book for Mechanical Engineers" is permitted.
10. Discuss the reaction, mechanism wherever necessary.

1. Design a combined footing for two columns C_1, $400\,mm \times 400\,mm$ with 8 bars of 16mm ϕ carrying service load of 850kN and C_2, $300\,mm \times 500\,mm$ with 8 bars of 20mm ϕ. Carrying a service load of 1400 kN. The column C_1 is flushed with the property line. The columns are at 3.5m c/c distance. SBC of soil is $200kN/m^2$. Use M20, Fe415 grade. **14**

2. Design a raft foundation for the layout of columns as shown in fig. All columns are of size $400 \times 400\,mm$. Use M20, Fe415. Assume 10% as load of raft and soil above. **14**



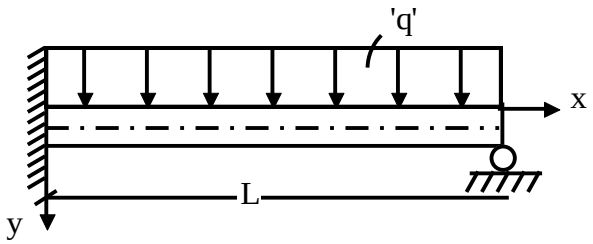
3. Design a Pile foundation where concrete pile is to driven into medium dense to dense sand. Coeff of Cateral earth pressure is 0.95 and fos is 2. **14**



4. Explain analysis and design of simple machine foundation. **14**

OR

5. Determine the deflection of the built-in beam on an elastic foundation show in figure. The beam is subjected to a uniformly distributed loading 'q' and is simply supported at x = L. **14**



6. What are drilled piers? state advantages and disadvantages of drilled piers. Write design considerations for drilled piers. **14**

OR

7. Design a cantilever retaining wall to retain earth for a height of 4.5m. The backfill is horizontal. The density of soil is 18kN/m^3. SBC of soil is 200kN/m^2. Take coefficient of friction between concrete and soil as 0.6. The angle of repose is 30º. Use M20 grade of concrete and Fe415 steel. **14**

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