

Answer all questions. Any missing data to be reasonably assumed

Question 1

- a) **Make a comparison** between cohesionless and cohesive soil.
- b) **Define :** (i) Void ratio, (ii) Porosity, (iii) Degree of saturation, (iv) Water content, (v) Dry unit weight, (vi) Wet unit weight, (vii) Submerged unit weight, (ix) Total Stress, (x) Effective Stress, (xi) Relative Density

Question 2

- a) **Explain briefly** the tests used to determine the wet unit weight in the field.
- b) The following charts of grain size analysis Fig.1 **Find** grading parameters uniformity coefficient and coefficient of gradation, percentage of Gravel, Sand, Silt and Clay and the effective diameter for Soil A, B and C.

Question 3

- a) For the soil profile shown in Fig. 2; find the total vertical stress, the vertical effective stress and pore water pressure at points A, B and C.
- b) **Design a square footing** which supports a square column 50x50 carrying 120 t. The net allowable soil pressure is 12 t/m^2 , $D_f=2.00 \text{ m}$, $q_{sh}=4.50 \text{ kg/cm}^2$ for footing, and $q_{cp}=10 \text{ kg/cm}^2$. Use plain concrete thickness 20.0 cm .

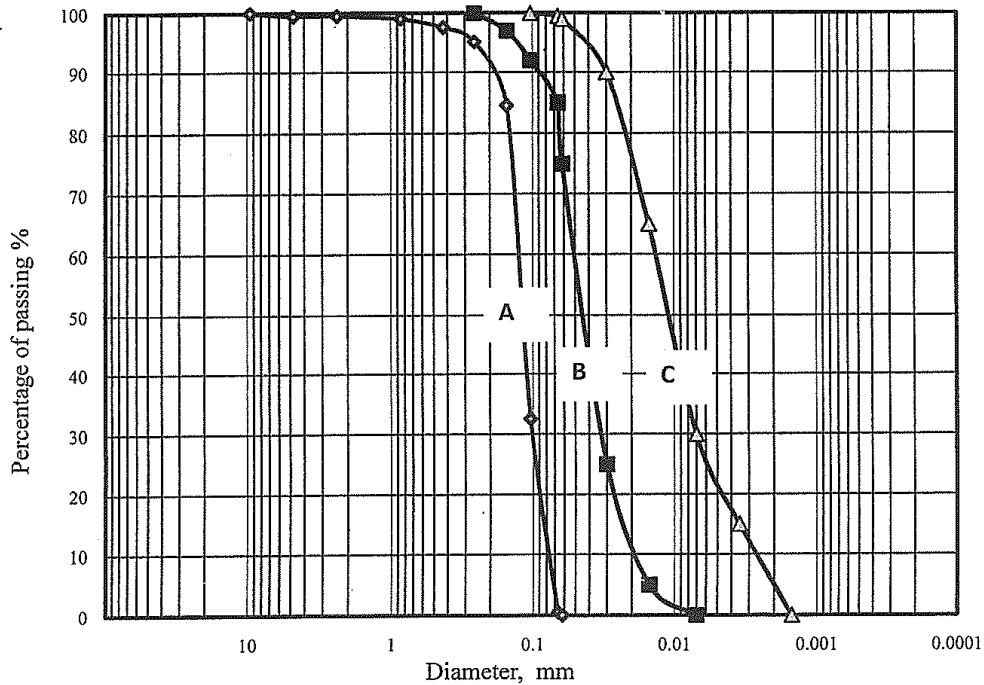


Fig.1

- c) **Design a rectangular combined footing** for an exterior column and an interior column carrying 180 ton and 120 ton at ground surface, respectively, as shown in Fig. 3. The net allowable bearing capacity of the soil at foundation level is 15 t/m^2 . Draw sections elevation and plan showing concrete dimensions and the details of reinforcement.

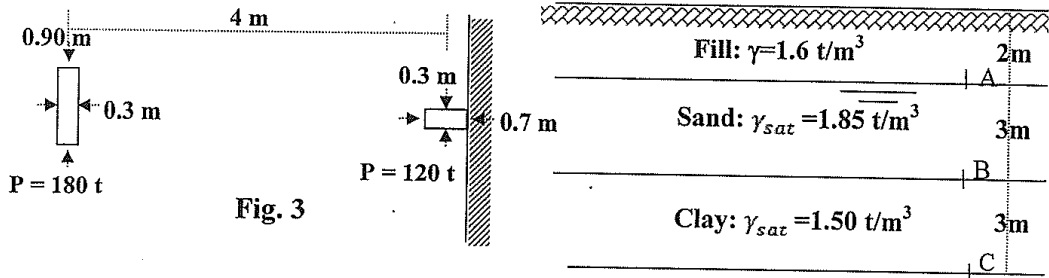


Fig. 3

Fig. 2

- d) Without any calculations **draw the details of reinforcement** for the sections in footings shown in Fig. 4 focusing on the main reinforcement.

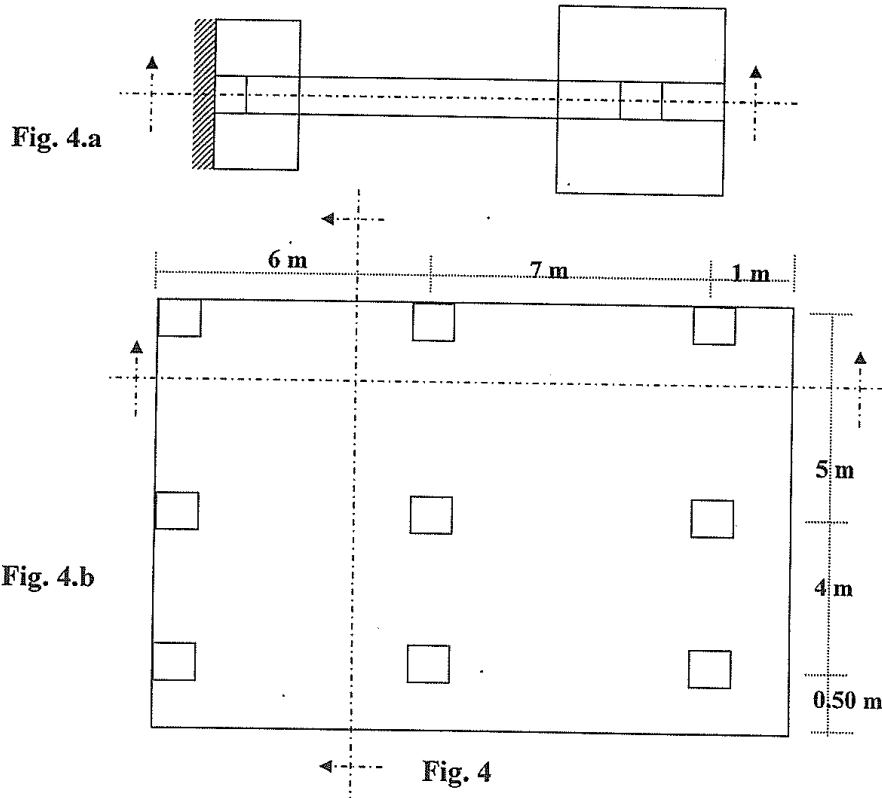


Fig. 4.a

Fig. 4.b

Fig. 4

Best Wishes

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