Kafr El-Sheikh University *Faculty Of Engineering* *Civil Engineering Department* *Year : Third Year Civil*	*Final Exam 2018-2019* *Foundation Engineering(1)*	*Final Exam :2 pages* *Date : 9 /6 /2019* *Time allowed : 3 Hrs.* *Academic Number: CES 3220*

Exam consists of two pages, try to answer all questions.
any missing data can be assumed.

Take: k_1=0.36, k_2=1760

Question (1) (20%)

(A). Discuss the problems in foundations adjacent to property line showing the different structural solutions.

(B). Differentiate between smell and strap beam showing the function and reinforcement details.

(C). It is required to design a rectangular footing to support a column of frame 30 cm × 60 cm in cross section. The footing subjected to a vertical load of 150 tons, and subjected to Permanent moment of 15 t.m as shown in Fig. (1). Knowing that: The allowable net bearing capacity in footing site is 2 kg/cm², plain concrete thickness =40 cm, and D_f =2 m, q_{sh}=6 kg/cm², q_p =9 kg/cm² and q_b = 12 kg/cm² (Hint: the stress under footing is uniform).

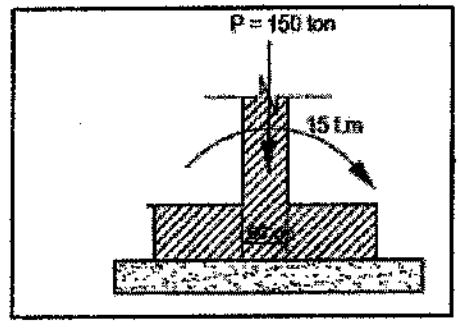


Fig. (1)

Question (2) (20%)

(A) . Discuss the optimum condition to use the ribbed raft and discuss how to design its slab.

(B). Identify the situations when a strap footing shall be used.

(C). Design a suitable combined footing for supporting a R.C two columns in as shown in Fig.2. C_1(45*70 cm) and carrying load 170 ton and column C_2(45*50 cm) and carrying load 100 ton. The spacing between the center line of the two column is 4.5 m. Knowing that: The allowable net bearing capacity in footing site is 0.7 kg/cm², q_{sh}=4.5 kg/cm², q_p=9 kg/cm², qb=12 kg/cm² and thickness of plain concrete equals to 40 cm. Finally draw details of reinforcement (Hint: the stress under footing is uniform)

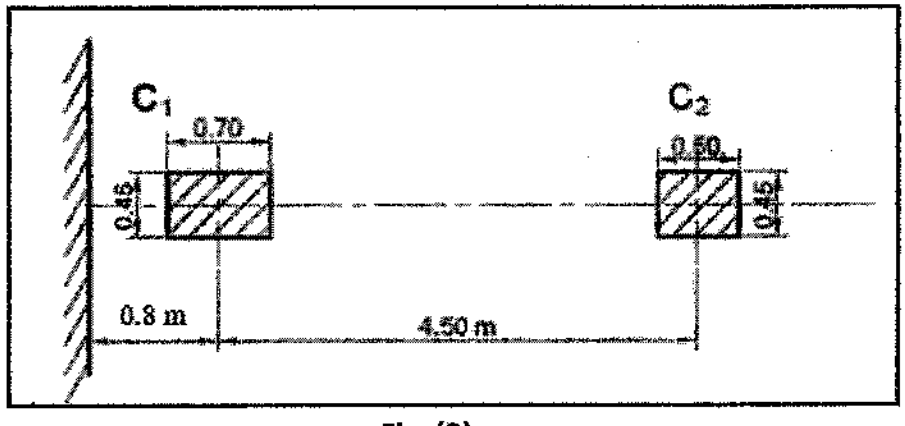
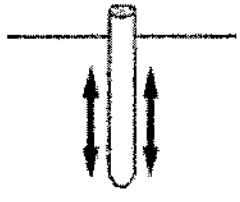


Fig. (2)

Question (3) (25%)

(A) Choose the Correct Answer from the Multiple-Choice List

1. The figure below represents ..... piles.  a) Load bearing b) End bearing c) Friction d) Sheet	2. A foundation is said to be shallow if its depth is ..... than its width. a) Equal to and Less than b) Greater than c) None of the mentioned d) All of the mentioned

3. which of the following, is a type of shallow footing? a) Spread footing b) Pile foundation c) Pier foundation d) Well foundation	4. The pressure intensity beneath the footing depends upon ..... a) Rigidity of the footing b) Soil type c) Condition of soil d) All of the mentioned
5. In cohesive soil, the pressure distribution beneath the footing is ..... a) Linear b) Nonlinear c) Zero d) None of the mentioned	6. When two column loads are unequal, which of the possible footing can be provided? a) Strap footing b) Raft footing c) Trapezoidal combined footing d) Mat footing

(B). Design a rigid raft foundation for the columns shown in Fig. (3). The net allowable bearing capacity is 0.5 kg/cm^2, γ_{soil} = 1.6 t/m^3, plain concrete thickness = 30 cm, and D_f =1.5 m. All columns are 50*50 cm. Draw sections elevation (1,1&2,2) and plan showing concrete dimensions and details of reinforcement.

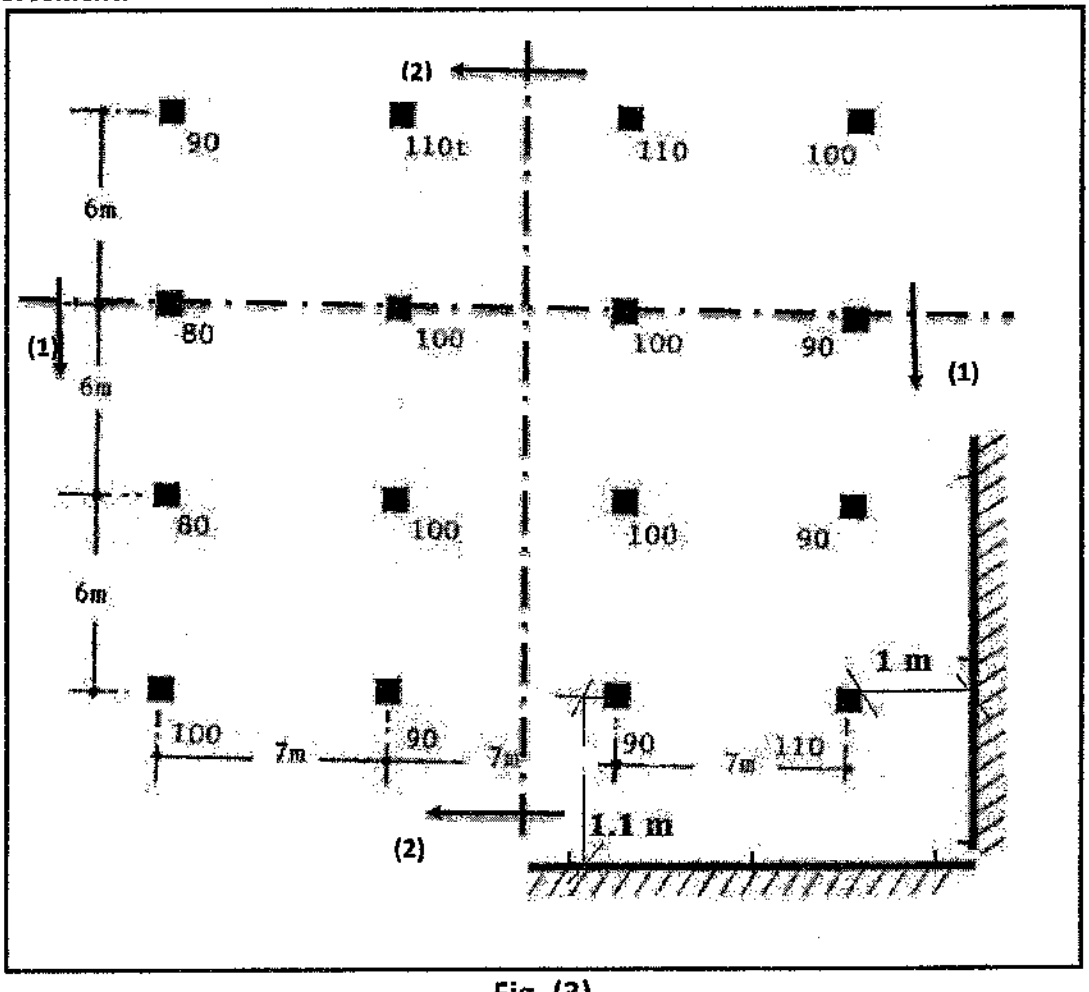


Fig. (3)

Question (4) (35 %)

(A). In short, mention what you know about the following:

(1) Types of Piles (2) Negative Skin Friction

(B). Discuss what is meant by group pile action - define group pile efficiency and illustrate how to estimate it.

(C). For the shown plan in Fig. (4), if the thickness of the cap is 0.9 m and the bottom reinforcement in both directions is 7 Ø 22 / m. You are to find out the safe column load that can be supported by this cap.

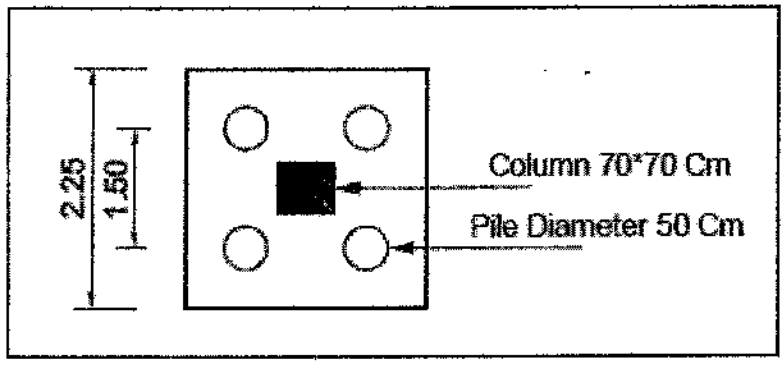


Fig. (4)

(D). For the two columns shown in Fig. (5), Please do the following (Knowing that: Piles diameter is 50 cm and the pile working load 55 t)

i. **Suggest a pile arrangement for a combined pile cap**
ii. **Compute the maximum and minimum actual pile load knowing that each column is subjected to a temporary wind moment = 10 t.m in any direction**
iii. **Design a combined footing (deep foundation).**
iv. **Draw sections elevation and plan showing concrete dimensions and the reinforcement details.**

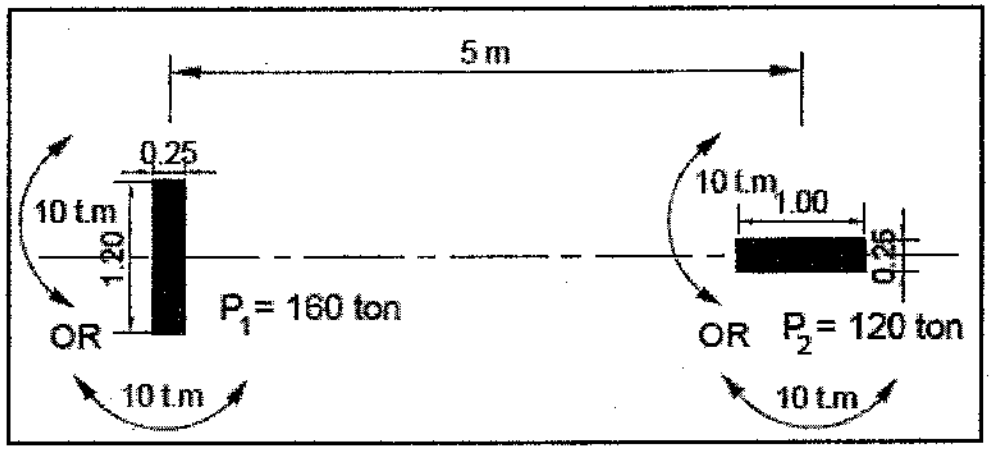


Fig. (5)