

Seat No.	
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**B.E. (Civil Engg.) (Semester - VII) Examination, Dec. - 2013**  
**ADVANCED FOUNDATION ENGINEERING (Elective - I)**  
**Sub. Code : 47908**

Day and Date : Tuesday, 03 - 12 - 2013  
 Time : 2.30 p.m. to 5.30 p.m.

Total Marks : 100

- Instructions :
- 1) Question 1 and 5 are compulsory.
  - 2) Attempt any other two questions from each section.
  - 3) Figures to the right indicates full marks.
  - 4) Use of non-programmable calculator and relevant I.S. Codes are allowed.

**SECTION - I**

- Q1) Write Note on (any three) :** **[18]**
- a) Explain drilled pile and driven pile.
  - b) Strap beam footing
  - c) Engineering News and Hiley's formula
  - d) Under-reamed pile foundation.
- Q2) a) Explain in details step wise procedure of design a trapezoidal combine footing with neat sketch.** **[8]**
- b) A trapezoidal footing is to be produced to support two columns of  $300 \times 450$  and  $450 \times 600$  mm sides respectively Columns are 6.0 m apart and safe bearing capacity of the soil is  $300 \text{ kN/m}^2$ . The smaller column carries 2000kN and the bigger 4000kN. Design a suitable size of the footing so that it does not extend 0.5 beyond the faces of the columns. **[8]**
- Q3) a) Explain in details I.S. Code method of analysis raft foundations?** **[8]**
- b) A raft foundation  $12 \text{ m} \times 12 \text{ m}$  is to be constructed in a clayey soil having shear strength of  $14 \text{ kN/m}^2$ . Unit weight of soil is  $16 \text{ kN/m}^3$ . If ground surface carries a surcharge of  $18 \text{ kN/m}^2$ . Calculate the maximum depth of foundation to ensure a factor of safety of 1.5 against base failure.  $N_c = 5.70$ . **[8]**

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- Q4) a) Explain what do you understand by "Group Efficiency" of piles. Briefly describe the method to estimate the settlement of a pile group in clay. [8]
- b) 200 mm diameter, 8 m long piles are used as foundations for a column in a uniform deposit of medium clay ( $9u = 100 \text{ kN/m}^2$ ). The spacing between the piles is 500 mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume  $\alpha = 0.9$  and factor of safety of 2.5. [8]

**SECTION - II**

- Q5) Write Note on (any three) : [18]
- a) Foundation installation
  - b) Types & use of cofferdams.
  - c) Grip length of a well foundation.
  - d) Methods of underpinning.
- Q6) a) Write in brief the design of foundations for reciprocating machines. [8]
- b) Assuming resonance to have occurred at a frequency of 15 cycles/sec in a vertical vibration of a test block  $1.0 \text{ m} \times 1.0 \text{ m} \times 1.5 \text{ m}$ . determine the value of  $C_u$ . The weight of the oscillator is 1200N and force produced by it after 15cycles is 1800N. Compute the maximum amplitude in the vertical direction at 20 cycles/sec. Weight of test block is  $28 \text{ kN/m}^3$ . [8]
- Q7) a) Explain the methods to correct the tilts and shifts in well foundations during sinking. [8]
- b) Write a brief note on sheet pile wall with respect to failure mechanism. [8]
- Q8) a) Write in detail about design of foundations on expansive soils. [8]
- b) Explain in detail damage and vibrations due to constructional operations. [8]

