

Roll No .....

**MVSE-301(B)****M.E./M.Tech. III Semester**

Examination, June 2017

**Advance Foundation Engineering**

(Elective-I)

Time : Three Hours

Maximum Marks : 70

- Note:** i) Attempt any five questions.  
 ii) All questions carry equal marks.  
 iii) Assume suitable data wherever necessary.

1. a) What is meant by 'significant depth of exploration'? Give two empirical guidelines which enable the determination of the depth of exploration. 7  
 b) The observed N-value in a standard penetration test at 4m depth was 17. The ground water level is at G.L. The soil profile shows sand up to 7m depth. Unit weight of sand is  $19 \text{ kN/m}^3$ . Find the corrected N-value. 7
2. a) What is the effect of rise of water table on the bearing capacity and settlement of a footing on a soil. 6  
 b) Compute the safe bearing capacity of a circular footing of diameter 1.5m located at a depth of 1.2m in a cohesionless soil layer with an average saturated unit weight of  $20 \text{ kN/m}^3$  and the angle of internal friction of  $20^\circ$ . The bearing capacity factors are  $N_c = 17.7$ ,  $N_q = 7.4$  and  $N_\gamma = 5.0$ . Take factor of safety as 2.5 and depth of water table very deep. What will be the reduction in the value if the water table rises to the surface due to excessive rainfall. 8

3. a) What is 'negative skin friction'? How is it calculated for a single pile and a group of piles in clay? 6  
 b) A 15m long RCC pile is installed in a deposit of uniform sand. The pile head is subjected to a horizontal force of 40kN. Assuming the coefficient of subgrade modulus  $10 \times 10^6 \text{ N/m}^3$ , calculate the deflection of pile head. What will be the change in deflection, if pile head is fixed? Assume EI of pile as  $4 \times 10^7 \text{ Nm}^2$ . 8
4. a) What is modulus of subgrade reaction? How it is determined? 6  
 b) A building is to be supported by a raft of size  $20\text{m} \times 10\text{m}$ . The weight of building and the load it can carry may be assumed to be 25000 kN. The subsoil is clay having a unit weight of  $19 \text{ kN/m}^3$  and unconfined compressive strength of  $70 \text{ kN/m}^2$ . The factor of safety against bearing capacity failure is 3.0. At what depth should the raft foundation be placed. 8
5. a) What are the methods to estimate the bearing capacity of 'stratified soils'? 6  
 b) A 300 mm square pile 15m long is driven in a deposit of medium dense sand ( $\phi = 36^\circ$ ,  $N_r = 40$ ,  $N_q = 42$ ). The unit weight of sand is  $15 \text{ kN/m}^3$ . What is the allowable load, assuming a factor of safety of 3. Assume lateral earth pressure coefficient as 0.6. 8
6. a) What is a cofferdam? Describe different types of cofferdams? What are their relative merits and demerits. 6  
 b) How stability analysis of cofferdam is carried out? 8

7. Differentiate between 3½×4
- a) Natural frequency and forced frequency
  - b) Under damped and over damped systems
  - c) Single degree and two degree of freedom system
  - d) Force isolation and motion isolation.
8. Write short notes on: (any four) 3½×4
- a) General design criteria for machine foundations.
  - b) Interlock stresses
  - c) Ultimate bearing capacity of pile groups
  - d) Core recovery and RQD
  - e) Electrical resistivity method

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