

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013****Subject code: 1721503****Date: 31-12-2013****Subject Name: Advanced Foundation Engineering****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) State and explain Meyerhof's bearing capacity theory and state how it differs from Hanson's bearing capacity equation. **07**

(b) A footing of 2m x 3m in size acted upon by a load inclined at 15° with the vertical and at an eccentricity of 0.3m from the centre along both axes. If the footing is placed at 2.0 m depth in c- ϕ soil having $\Gamma_b = 17 \text{ kN/m}^3$, $\Gamma_{\text{sat}} = 19 \text{ kN/m}^3$, $c = 10 \text{ kN/m}^2$ and $\phi = 32^\circ$. What load this footing can carry with factor of safety 2.5. If water table rises to 1.0 m from G.L., what reduction on capacity will occur?
For $\phi = 32^\circ$, $N_c = 35.0$, $N_q = 21.7$, $N_\Gamma = 20.6$
 $N'_c = 21.4$, $N'_q = 10.0$, $N'_\Gamma = 6.5$ **07**

Q.2 (a) Define "Foundation Modulus". How is it obtained? **07**

(b) Explain design criteria for satisfactory action of a machine foundation, **07**

OR

(b) A concrete pile, 30 cm dia. is driven in medium dense sand for a depth of 8 m. The soil properties are: $\Phi = 35^\circ$, $\gamma = 20 \text{ kN/m}^3$. Estimate the safe load with factor of safety 3.0. **07**

Q.3 (a) What is bore log? Show a typical bore log and explain its utility. **04**

(b) Following is the cyclic pile load test data performed on 16 m long pile with dia. 400 mm driven in a deposit of sand. Compute allowable load on pile as per I.S. code of practice. **07**

Load (kN)	100	200	300	400	500	600	700	800	850
Total Settlement (mm)	0.4	1.2	2.4	3.25	5.6	8.25	11.25	17.0	27.25
Net Settlement (mm)	0.15	0.65	1.5	2.55	3.9	5.9	8.0	11.75	21.5

(c) Give factors affecting bearing capacity of soil in detail. **03**

OR

Q.3 (a) Explain p-y curves and its utility. **07**

(b) A group of nine friction piles arranged in a square pattern is to be proportioned in a deposit of medium stiff clay. Assuming the size of piles is 30 x 30 cm and 10 m long. Find the optimum spacing for piles. Assume $\alpha = 0.8$ and $C_u = 50 \text{ kN/m}^2$ **07**

Q.4 (a) Briefly describe design of RE wall. **07**

- (b) A machine having a total weight of 20000 kN has an unbalance such that it is subjected to a force of amplitude 5000 kN at a frequency of 600 rpm. What should be the spring constant for the supporting springs if the maximum force transmitted into the foundation due to the unbalance is to be 500 kN? Assume that the damping can be neglected. **07**

OR

- Q.4** (a) List methods of analysis of block foundation and give any one in detail. **07**
Q.4 (b) Give the methods to determine dynamic soil parameters in field. Explain any one in detail. **07**

- Q.5** (a) Draw neat sketch showing forces acting on well foundation and discuss criteria for determining grip length of well foundation. **07**
(b) Write interpretations and limitations of SPT. **07**

OR

- Q.5** (a) Discuss the methods to reduce settlement in building. **07**
(b) Explain with the help of neat diagram, various applications of soil reinforcement. **07**
