GUJARAT TECHNOLOGICAL UNIVERSITY
M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1721503   **Date: 10/07/2012**
Subject Name: Advanced Foundation Engineering
Time: 10:30 am – 13:00 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)** What do you mean by shear failure? Differentiate between GSF and LSF.   **07**

(b) A footing of 1.5m x 2m in size acted upon by a load. If the footing is placed at 2.0 m depth in   **07**
c- ø soil having Y_b = 18 kN / m^3, Y_{sat} = 19.5 kN/m^3, c = 12 kN / m^2 and ø =30°. 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   ø =30°, Nc =35.0, Nq = 21.7, N$_Y$ =20.6, N'c = 21.4,
N'q = 10.0, N'$_Y$ = 6.5.

Q.2 **(a)** Give soil exploration steps to explore the area of 500m^2.   **07**

(b) Give the methods to determine dynamic soil parameters in field. Explain any one in   **07**
detail.

OR

(b) A machine having a total weight of 20000 kN has an unbalance such that it is subjected to a   **07**
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.

Q.3 **(a)** A plate load test was conducted with a 30 cm square plate on sand deposit and following   **07**
results were obtained:

Load (kN):	5	10	15	20	25	30	35
Settlement(mm):	1.25	2.5	3.75	5.0	7.5	15	25

Determine design bearing capacity for a footing 3 m X 3 m for a factor of safety of 2.5 and
allowable settlement 40 mm.

(b) A group of 9 piles with 3 piles in a row was driven into soft clay extending from ground level   **07**
to a great depth. The diameter and length of piles were 30 cm and 10m respectively. The
unconfined compressive strength of the clay is 70 kPa. If the piles were placed 90 cm center
to center, compute the allowable load on the pile group on the basis of a shear failure criteria
for a factor of safety = 2.5.

OR

Q.3 **(a)** A group of nine friction piles arranged in a square pattern is to be proportioned in a deposit of   **07**
medium stiff clay. Assuming the size of piles is 30 cm x 30 cm and 10 m long. Find the
optimum spacing for piles. Assume α = 0.8 and Cu = 50 kN / m^2.

(b) What is floating raft foundation? Explain.   **07**

Q.4 **(a)** A rectangular footing 2.5 m X 4.0 m size is to be constructed at 2.0 m below ground level in   **07**
c-ɸ soil having the following properties: γ =17.5 kN/m^3, ɸ = 20°, C =10 kN/m^2. The footing
has to carry a gross vertical load of 800 kN , inclusive of its self weight. In addition, the
column is subjected to a horizontal load of 100 KN. Applied at a height of 3.0 m above the
base of footing. Determine the factor of safety of footing against shear failure as per I.S.-
6403-1981. (For ɸ = 20° Nc =14.83, Nq =6.40, Nγ =5.39).

(b) Explain Negative skin friction on single pile and on group of piles.   **07**

OR

Q.4 **(a)** Explain p-y curves for the solution of laterally loaded piles.   **07**
(b) Give cyclic pile load test in detail with its utility.   **07**
Q.5 **(a)** How will you calculate "Grip length" of well foundation?   **07**
(b) How water table affects the bearing capacity of soil?   **07**

OR

Q.5 **(a)** Show forces acting on the well foundation with neat sketch.   **07**
(b) Briefly describe design of RE wall.   **07**

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