

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER II – • EXAMINATION – SUMMER 2017

Subject code: 2724302**Date: 25/05/2017****Subject Name: Analysis & Design of Foundation Systems****Time: 02:30 PM to 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Draw neat sketches with details where necessary.
3. Make suitable assumptions.
4. Figures to the right indicate full marks.
5. Use of code IS 456 and SP 16 is permitted.

Q-1 Design a friction pile group is founded in clay up to 25 m depth underlain by hard rock to carry a load of 2500 kN including weight of pile cap. Unconfined compressive strength of clay is 80 kN/m^2 with voids ratio 1.2 and liquid limit 60%. Consider FS = 2.5 against shear failure. Also compute settlement of pile group designed. **14**

Q-2 What is Anchored Bulkhead"? Explain its stability criteria in detail. Which methods are in use for design of it? Explain in detail. **14**

OR

Q-2 Explain the following with reasons in two-three lines: **14**

- i What are the advantages of limit state method with compare to working stress method?
- ii Selection of type of retaining wall depends on which criteria?
- iii What is the difference between strap footing and strip footing? Give their limitations.
- iv Explain the basic principle of raft foundation and where raft foundations are more preferable?
- v What do you mean by elastic foundations? Which basic parameter is used to understand its mechanism?
- vi What is the advantage of under-ream pile and for which type of soil conditions it is used?
- vii Grouping of piles depends on which factors? How it is evaluated?

Q-3 (a) What do you mean by Winkler foundation? Explain with equations the finite difference method for design of beams resting on an elastic foundation. Show necessary calculations. **07**

- Q-3 (b)** Explain with equations the finite difference method for design of mat foundations. Show necessary calculations. **07**

OR

- Q-3** Design a slab beam type combined footing for the following data: **14**

Column	M1	M2
Size	300mm x 300mm	300mm x 300mm
Concrete	M20	M20
Main steel	6-20 ϕ	8-20 ϕ
DL & LL	500kN & 200kN	700kN & 250kN

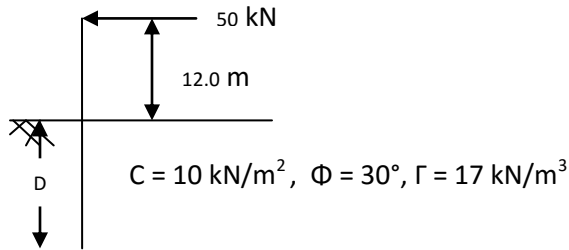
The width of the base shall not exceed 2.0m. The safe bearing capacity of soil is 190 kN/m². Footing materials are M20 and HYSD-Fe415.

- Q-4** Give uses of Mat foundation. Which are common types of mat foundations? List the various factors influencing settlement of mat foundation. What is the basic difference between ‘rigid method’ and ‘elastic plate’ method for design of mat foundation? **14**

OR

- Q-4** Design a slab-beam type strip footing for column C1, C2,C3,C4 of size 300 X 300 mm spaced at 4.0 m centre to centre and column loads are 800, 1200, 900 and 800 respectively. Width of footing is restrained to 2.0 m. Grade of concrete used is M 20 and reinforcement is Fe 415. SBC=150 kN/m². **14**

- Q-5 (a)** Determine depth of embedment for cantilever sheet pile shown in figure,



- Q-5(b)** Which foundation would you prefer for Bunkers and Silos? Explain its design criteria in detail. **07**

OR

- Q-5** Design a pile cap for column 300 x 300 mm in section supported on group of four piles 1.2 m c/c at its centre. Total load transfer to column is 900 kN. Use M 20 and Fe 415 **14**