Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2724302 **Date: 26/05/2015**

Subject Name: Analysis and Design of Foundation systems

Time: 2:30 PM – 5:00 PM **Total Marks: 70**

Instructions:

1. Use of IS: 456 and SP:16 is allowed.
2. Draw neat sketches with detailing.
3. Draw soil pressure distribution diagram where necessary.
4. Make suitable assumptions wherever necessary.
5. Figures to the right indicate full marks.

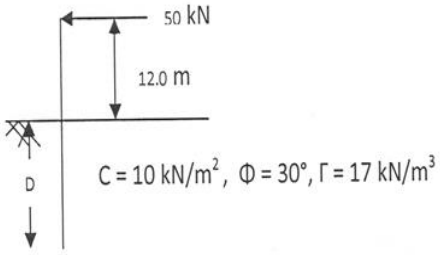
Q-1 Design a slab-beam type strip footing for column C1, C2,C3,C4 of size 300 X 300 mm spaced at 4.0 m centre to centre and column loads are 800, 1200, 900 and 800 respectively. Width of footing is restrained to 2.0 m. Grade of concrete used is M 20 and reinforcement is Fe 415. SBC=150 kN/m^2. 14

Q-2 (a) Explain Winkler foundation. Give solution for beams resting on elastic foundation. Support your answer showing necessary equation for slope, deflection, moment and shear force. 07

OR

(a) Explain in detail step wise procedure for beams resting on elastic foundation using finite difference method. Show necessary boundary conditions. 07

(b) Determine depth of embedment for cantilever sheet pile shown in figure, 07



Q-3 (a)	Which foundation would you prefer for oil tanks? Explain its design criteria in detail.	07
(b)	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?	07

OR

Q-3	Design an isolated slab-beam footing for column of size 230 X600 mm carrying service load of 600 kN and service moment of 100 kN.m about its major axis. The column is reinforced with 8 nos. 25 mm dia. HYSD FE 415 grade bars in M25 Grade concrete. The footing materials are M 20 and Fe 415. SBC=180 kN/m^2.	14

Q-4 (a)	What do you mean by stability of Anchored Bulkhead"? Which methods are in use for design of it? Explain in detail.	10
(b)	Which foundation would you prefer in expansive soil? Justify your answer with mechanism.	04

OR

Q-4	Proportion a friction pile group 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-5	Design a cantilever wall to retrain a backfill of 8.0 m high having given properties: c= 100 kN/m^2, $\varphi = 29°$ and $\Gamma = 16.3$ kN/m^3.	14

OR

Q-5	Design a pile cap for column 350 x 350 mm in section supported on group of three piles 1.2 m c/c at its centre. Total load transfer to column is 600 kN. Use M 20 and Fe 415	14