Paper Code: STR 32-D   **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

M.TECH
(SEM III) ODD SEMESTER EXAMINATION 2015-2016
FOUNDATION ANALYSIS AND DESIGN

Time: 3 Hours   *Total Marks: 100*

Note: **(i)** Attempt ALL questions.
(ii) Use of Code is allowed
(iii) Marks are indicated against each question.
(iv) Assume any data suitably, if required and not given.

1.	Attempt any TWO questions:	**10x2=20**
(a)	What do you understand by bearing capacity of soil? Name different methods for determination of Bearing Capacity. Explain the following terms. i. Gross pressure intensity ii. Net ultimate bearing capacity iii. Allowable bearing pressure iv. Safe bearing pressure v. Ultimate bearing capacity	
(b)	What will be the gross and net safe bearing pressure of sand having $\varphi = 30^0$ and effective unit weight 1.35 tones/m^3 under the following cases: i. 1.00 m wide strip footing ii. 1.00m X 1.00m square footing In the above problems, consider the footing is placed at a depth of 1 m from ground surface and water table is at a great depth. Assume a factor of safety of 3.0. Use Terzaghi's theory. Given for $\varphi = 30^0$ from Terzaghi's chart $N_q = 47$, $N_\gamma = 43$	
(c)	A strip footing is to carry a load of 100 kN/m at a depth of 1m. Shear strength parameters for the soil are c = 0 and $\varphi = 31°$. Determine the minimum width of the footing for a FOS = 3 against shear failure. The water table may rise to the base of the footing. Take Gs = 2.65, and $\gamma = 16$ kN/m^3.	
2.	Attempt any TWO parts of the following	**10x2=20**
(a)	What are the different causes of failure of foundation? Design an unreinforced concrete wall footing for a wall 450 mm thick carrying a load of 399 kN per meter run. The safe bearing capacity of the soil is 140 kN per meter^2. Use M$_{20}$ concrete.	
(b)	What factors are to be considered for designing of foundation? And what are the general requirements of foundation for satisfactory performance. Find the area and the depth of foundation required for a column carrying an axial load of 1250 kN. The safe bearing capacity of the soil is 120 kN/m^2. The soil at the site weighs 18 kN/m^3 and has an angle of repose of 28°.	
(c)	A trapezoidal footing is to be produced to support two square columns of 30 cm and 50 cm sides respectively. Columns are 6 metres apart and the safe bearing capacity of the soil is 160 kN/m^2. The larger size column carries 3000 kN while the smaller	

		carries 2000 kN. Design a suitable size of the footing so that it does not extend beyond the faces of the columns.	
3.		Attempt any TWO parts of the following	**10x2=20**
	(a)	What are different types of foundation, explain them with neat sketch. Write the general Principle of Design of Combined footing either Rectangular or Trapezoidal with neat sketch.	
	(b)	A square column 400mm x 400mm carries an axial load if 1500 kN. Design square footing for the column. The safe bearing capacity of the soil is 150 kN /m^2. Use M$_{20}$ concrete and Fe 415 steel.	
	(c)	Design a reinforced concrete combined rectangular footing for two columns A and B located 3.60 m apart. The sizes of the column 400mm x 400mm and 600mm x 600mm and the loads on them are 1000 kN and 1500 kN respectively. The projection of the footing parallel to the length of footing beyond axis of the column A is limited to 590 mm. the safe bearing capacity is 170 kN /m^2. Use M$_{20}$ concrete and Fe415 steel.	
4.		Attempt any TWO parts of the following	**10x2=20**
	(a)	What do you understand by soil-structure interaction (SSI).What are the critical aspects of SSI. What are the different methods of analysis? Explain any one of these in brief.	
	(b)	Design a reinforced concrete cantilever type retaining wall having a 5 m tall stem. The wall retains oil level with its top. The soil weighs 18000 N/m^3 and has angle of repose of 30°. The safe bearing capacity of the soil 200 kN/m^2. Use M$_{20}$ and Fe415.	
	(c)	Explain general principle for design of under- reamed pile. Under what condition these types of foundations are adopted.	
5.		Write short notes on any **FOUR** from the following, with neat sketch	**5x4=20**
		a. Design of pile foundation. b. Difference between Cohesive and Non-cohesive soil. c. Factors affecting the location of foundation d. Principles of Design of isolated footing e. Distribution of contact pressure for different footings	