Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1724302 **Date: 03-12-2014**

Subject Name: Analysis and Design of Foundation Systems

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt <u>any five</u> questions.**
2. **Use of IS:456 and SP:16 is allowed.**
3. **Draw neat sketches with detailing.**
4. **Draw soil pressure distribution diagram where necessary.**
5. **Make suitable assumptions wherever necessary.**
6. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define Limit State method for design of reinforced concrete structures. Give various criteria to classify limit state as per IS: 456.	**07**
	(b)	What is ñShell foundationò? Explain in detail classification and design concepts for it.	**07**
Q.2		Design a slab-beam type strip footing for column C1, C2,C3,C4 of size 350 X 350 mm spaced at 4.0 m centre to centre and column loads are 900, 1300, 1000 and 900 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.3		Design a rectangular isolated slope footing for a column of size 250mm X 250mm carrying a characteristic axial load of 1800 kN and reinforced with10 nos. 25mm dia. bars in M30 grade concrete. SBC is 190kN/m^2 at 2.0 m depth. Use M 20 and Fe 415.	**14**
Q.4	**(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**
	(b)	Explain the IS criteria for reinforcement curtailment retaining wall.	**07**
Q.5	**(a)**	Design a pile cap for a column 300mm X 300mm in section supported on group of three piles at its centre. The total load transferred to the column is 600kN. Piles are at 1.2 m c/c. Use M20 and Fe 415.	**10**
	(b)	Explain Under-reamed pile with its load transfer mechanism.	**04**
Q.6	**(a)**	Explain in detail step wise procedure for beams resting on elastic foundation using finite difference method. Show necessary boundary conditions.	**07**
	(b)	Find length of pile (300mm dia.) in sandy clay required to support a load of 200kN. Properties of soil are: F.S = 4, μ=0.35, ū = 30°, ɔ = 18 kN/m^3.	**07**
Q.7		Design only stem of a counterfort retaining wall with necessary stability checks to retain a soil of height 6.5 m above ground level. Take $ɔ_b$ = 18 kN/m^3, SBC = 200 kN/m^2, ū = 32°, μ= 0.55, f_{ck}=20 MPa and fy = 415MPa.	**14**

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