Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code:X50603 **Date:05/12/2015**

Subject Name: Foundation Engineering

Time: 10:30am to 1:00am **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of Programmable calculator is strictly prohibited**
5. **Draw neat sketch wherever necessary**

Q.1 Choose the correct answer from the following: **14**

(i) If the actual value of the SPT (N) is less than or equal to 15 for silty fine sands below water table, the corrected value of Nc is _____
(a) equal to N
(b) 15 - ((N+15)/2)
© 15 + ((N-15)/2)
(d) none of the above

(ii) Select the incorrect statement: For a good quality soil sample,
(a) The area ratio should be low (b) The cutting edge should be thick
(c) The inside clearance should be small (d) The outside clearance should be small

(iii) Geophysical methods are useful for preliminary investigations. (True/False)

(iv) The permissible settlements is the maximum in the case of
(a) Isolated footing on clay (b) Raft on clay
(c) Isolated footing on sand (d) Raft on sand

(v) If the gross bearing capacity of strip footing 1.5m wide located at a depth of 1m in clay is 350kN/m^2, its net bearing capacity for γ = 20kN/m^2 is
(a) 370 kN/m^2 (b) 330 kN/m^2 (c) 350 kN/m^2 (d) 400 kN/m^2

(vi) The allowable soil pressure for foundation in cohesive soil is generally controlled by
(a) settlements (b) bearing capacity
(c) both (a) and (b) (d) neither (a) nor (b)

(vii) Negative skin friction occurs when the surrounding soils settles more than the pile. (True/False)

Q.2 (a) What do you mean by bearing capacity? Enlist various types of bearing capacities and define them. **07**

(b) A square footing is to be designed to carry a load of 500kN. If the depth of foundation is 1.5m, determine a suitable size of foundation with FOS of 3. The water table is at foundation level. Take Ø' = 25°, γ = 16kN/m^3, γsat = 19kN/m^3. Use Terzaghi theory and assume general shear failure. **07**

OR

(b) What do you mean by expansive soil? What are the effects of swelling of soil on buildings? **07**

Q.3 (a) Explain in detail with neat sketch plate load test by truss reaction method. **07**

	(b)	A strip footing of 2m width is founded at a depth of 4m below the ground surface. Determine the net ultimate bearing capacity using (a) Skempton's equation (b) IS code. Take soil parameters Ø = 0 and c = 10 kN/m^2, γ = 20kN/m^3. Take N_c= 5.7, N_q = 1, N_γ = 0	**07**
		OR	
Q.3	**(a)**	Explain factors affecting selection of type of foundation.	**07**
	(b)	Define geosynthetics and enlist its types. Also write in detail the various applications of geosynthetics with neat sketch.	**07**
Q.4	**(a)**	Discuss the various types of foundation settlement under loads and also state various causes of settlement	**07**
	(b)	State various methods of borings for exploration. Explain any two in detail	**07**
		OR	
Q.4	**(a)**	Define SPT value. Explain the corrections applied to SPT value with engineering reasons.	**07**
	(b)	A precast concrete pile of size 400mm X 40mm is to be driven into stiff clay. The unconfined compressive strength of the clay is 150 kN/m2. Determine the length of pile required to carry a safe working load of 300 kN with factor of safety is 2.5.	**07**
Q.5	**(a)**	A precast concrete pile 40 cm X 40 cm is driven by a single acting steam hammer.Estimate the allowable load using (a)Engineering News Record Formula (F.S.=6).(b)Hiley Formula(F.S.= 4).Use the following data: (i) Maximum rated energy = 4000 kN-cm (ii) Weight of hammer = 40 kN (iii) Length of pile = 15 m (iv) Efficiency of hammer = 0.82 (v) Co-efficient of resistitution = 0.5 (vi) Weight of pile cap = 3.2 kN (vii) No. of blows for last 25 mm = 6 (viii) Modulus of elasticity of concrete = 2 x 10^7 kN/m^2 Assume the other data, if necessary.	**07**
	(b)	What do you mean by under-ream pile and where it is used? Discuss its design guidelines with neat sketch.	**07**
		OR	
Q.5	**(a)**	Explain in detail pile load test with its limitations.	**07**
	(b)	A concrete pile, 30cm diameter, is driven into a medium dense sand (Ø =37°, γ = 19.5kN/m^3, K = 1.0, tanδ = 0.7) for a depth of 10m, estimate the safe load if the water table rises to 2m below the ground surface. Take γ_w = 10 kN/m^3	**07**