Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–V • EXAMINATION – WINTER 2013

Subject Code: X50603 **Date: 09-12-2013**

Subject Name: Foundation Engineering

Time: 10.30 am - 01.00 pm **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 greater than 15 for fine sands below water table, the corrected value of N is _____
(a) 15 + ((N+15)/2)
(b) 15 - ((N+15)/2)
© 15 + ((N-15)/2)
(d) 15 + ((15 - N)/2)

(ii) Area ratio is mathematically defined as _____
(a) $(D2^2-D1^2)/D1^2$ (b) $(D2-D1)/D1^2$ (c) $(D2+D1)/D2^2$ (d) $(D2^2+D1^2)/D2^3$

(iii) 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

(iv) The bearing capacity of soil supporting a footing of size 3m x 3m will not be affected by the presence of water table located at a depth below the base of footing of _____
(a) 1.0 (b) 1.5m
(c) 3.0m (d) 6.0m

(v) If the gross bearing capacity of strip footing 2.0m wide located at a depth of 1.5m in clay is $400kN/m^2$, its net bearing capacity for $\gamma = 20kN/m^2$ is
(a) $370\ kN/m^2$ (b) $380\ kN/m^2$ (c) $390\ kN/m^2$ (d) $360\ kN/m^2$

(vi) The load carrying capacity of a pile depends upon the
(a) skin friction (b) point resistance
(c) both (a) and (b) (d) neither (a) nor (b)

(vii) A 300mm diameter pile is driven 10m into a homogeneous consolidated clay deposit. The safe load when the factor of safety is 2.5, unit cohesion is $40\ kN/m^2$ and adhesion factor is 0.70,
(a) 150.8 kN (b) 105.6 kN
(c) 215.4 kN (d) 211.2 kN

Q.2 **(a)** Explain Standard penetration test. **07**

(b) A square footing 2.5 m X 2.5 m is built on a homogeneous bed of sand of density 19 kN/m3 having an angle of shearing resistance of 38^0. The depth of foundation is 1.5 m below the ground surface. Calculate the safe load that can be applied on the footing with a factor of safety of 3. Take bearing capacity factors as Nc= 27, Nq = 30, Nγ = 35. **07**

OR

(b) Discuss effect of inclination of load and water table on bearing capacity **07**

Q.3 **(a)** Explain factors affecting bearing capacity in detail **07**

(b) A strip footing 1 m wide and a square footing 1 m side are placed at a **07**

depth of 1 m below the ground surface. The foundation soil has cohesion of 10 kPa, angle of friction of 27° and unit weight of 18.2 kN/m^3. Calculate the safe bearing capacity using IS:6403. Use factor of safety of 3.

OR

Q.3 **(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: **07**

(i) Maximum rated energy = 4000 kN-cm
(ii) Weight of hammer = 40 kN
(iii) Length of pile = 15 m
(iv) Efficiency of hammer = 0.83
(v) Co-efficient of resistitution = 0.5
(vi) Weight of pile cap = 3.5 kN
(vii) No. of blows for last 25 mm = 8
(viii) Modulus of elasticity of concrete = 2×10^7 kN/m^2
Assume the other data, if necessary.

(b) Explain factors affecting selection of type of foundation **07**

Q.4 **(a)** Enlist boring methods and explain any one in detail. **07**

(b) Explain the types of geosynthetics and its various applications in foundation engineering. **07**

OR

Q.4 **(a)** What are the effects of swelling of soils on buildings? **07**

(b) Briefly explain Settlement of single pile and settlement of group of pile. **07**

Q.5 **(a)** A 40 cm square pre-cast RCC pile is driven by 9 m into a sandy bed. The standard penetration test results, performed on this ground are given below **07**

Depth(m)	1.5,	3,	4.5,	6,	7.5,	9,	10.5,	12
SPT-N Value	4,	6,	12,	14,	20,	24,	35,	39

Compute the factor of safety available if 1000 kN of compressive load is applied on this pile.

(b) Explain General shear failure and Local shear failure with neat sketch. **07**

OR

Q.5 **(a)** Explain Engineering News Record formula and Hileys formula for estimating load carrying capacity of pile with necessary equations. **07**

(b) Explain Plate load test. **07**

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