Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 1722005 **Date:14/05/2015**

Subject Name: **Advanced Foundation Engineering**

Time: 02:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Compute the safe bearing capacity for a 2.0 m x 2.50 m size rectangular footing placed at 2.4 m depth below the ground level. G.W.T. = 3.0 m G.L. soil properties γ_t = 17 kN/m^3, γ_{sat} = 19 kN/m^3, C = 40 kpa, ϕ = 25 ↔ **07**

ϕ	N_c	N_ϕ	N_r
25	25.1	12.7	9.7

(b) A pile group of 3 x 3 = 9 is embedded in uniform cohesive bed c/c spacing is 2m. (Cu = 60 kPa, ϕ u = 0, γ_t = 17 kN/m^3, G = 2.7, γd = 14.4 kN/m^3, L.L. = 58%). The piles diameter and length are 0.6m & 10.0m respectively. Calculate the settlement of the pile group under the applied load of 2000 kN. **07**

Q.2 **(a)** Find the ultimate load carrying capacity of the above pipe group as in Q.1 (b) considering Ŭ= 0.7 **07**

(b) A concrete pile 40 cm dia. is driven in medium dense sand for depth of 7.0 m. The soil properties are ϕ = 32 ,↔ = 19.5 kN/m^3. Calculate the safe load with factor of safety of 3.0 **07**

OR

(b) Explain ñStandard Penetration Testò. **07**

Q.3 **(a)** Write a detailed note on **07**
The various ground improvement techniques.

(b) Write a detailed note on **07**
Geosynthetics

OR

Q.3 **(a)** A foundation block of 2.5 t has a soil stiffness of 20,000 kN/m. if excitation force of 2.5 sin (10´ t) kN. Acts on the block causing it is vibrate vertically, determine natural frequency and amplitude of vertical displacement. **07**

(b) Design the dimensions of the ñTRAPEZOIDAL COMBINED FOOTINGò and draw only S.F. diagram for data given below. **07**

(i) LHS column 0.4 m x 0.4 m touching the property line on LHS, W_1 = 2400kN.
(ii) RHS column W_2 = 1800 kN.
(iii) c/c distance between column axes = 7.2 m
(iv) SBC = 150 kpa.

Q.4 **(a)** For the data given in Q.3 (b) or if SBC = 300 Kpa, design the dimensions of the ñSTRAP FOOTINGò and draw S.F. and B.M. diagrams mentioning typical values. **07**

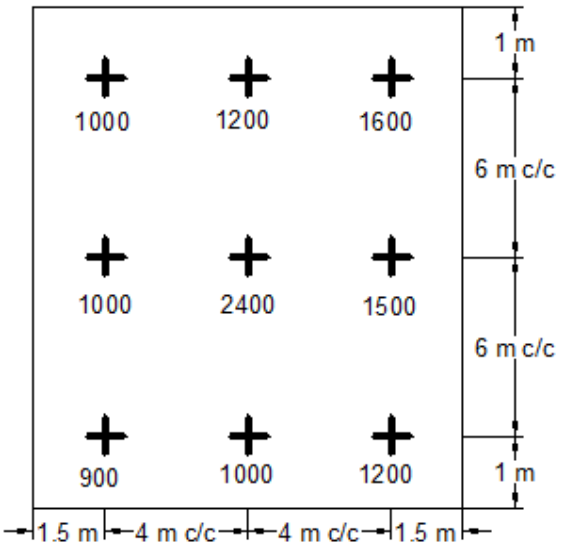
Q.4 **(b)** A machine weighing 1250 kg runs at a speed of 1000 rpm. It is supported on concrete block 6.0 m x 1.5 m and 3m thick. If Cu = 16700 kN/m^3, m_e.e = 0.65 kg.m and amplitude of displacement during operation shall be less than 0.15 mm. check the adequacy of foundation. **07**

OR

Q.4 (a) State and explain Reese and matlock solutions for lateral displacement (ρ_z), slope (Θ_z) moment (M_z), shear (Qz) and soil reaction (p_z) at depth z below ground surface for a free hand pile subjected to horizontal load Qh and moment Mo at the ground surface. **07**

Q.4 (b) Explain ñsoil Reinforcementò and draw neat sketches of various applications of soil reinforcement. **07**

Q.5 (a) For a raft shown below, compute the contact pressure under the corner points. If SBC 100 kpa, given comments on the results. Loads are in kN. (fig. is not to the scale) **07**



Q.5 (b) State and explain guidelines for dimensioning of cantilever retaining walls. **07**

OR

Q.5 (a) Design the dimensions of the ñRECTANGULAR COMBINED FOOTINGò and draw S.F. & B.M. diagram for data given below. **07**

(i) LHS column 0.4 m x 0.4 m touching the property line on LHS, W_1 = 1800kN.
(ii) RHS column W_2 = 2400 kN.
(iii) c/c distance between column axes = 7.2 m
(iv) SBC = 150 kpa.

Q.5 (b) Draw neat sketch showing forces acting on well foundation and discuss criteria for determining grip length of wall foundation. **07**