Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (CIVIL ENGINEERING)
END SEMESTER EXAMINATIONS, NOV/DEC 2018
SUBJECT: DESIGN OF FOUNDATIONS AND EARTH RETAINING STRUCTURES [CIE 4009]
REVISED CREDIT SYSTEM
(29 /11 /2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A.	What is 'grip length'? What is its importance in well foundation	**(2)**	**CO1**
1B.	A square footing is required to carry a net load of 1000kN at a depth of 1.5m. Using Teng's equation, determine the size of the footing for a permissible settlement of 25mm. The soil is sandy with $N_{corrected}$=20. Take a factor of safety of 3. Assume the water table is at a great depth.	**(3)**	**CO1**
1C.	A square footing of size 1.2m x 1.2m is to constructed at a depth of 1.5m having the following soil properties: γ=18 kN/m^3, c=12 kN/m^2 and ϕ=34°. The footing is subjected to a load of 1600kN inclined at 10° to vertical. Using Meyerhof's equation, determine the factor of safety against bearing failure. Assume general shear failure and water table at 4m. (Take Nc=42.2, Nq =2904, Nγ=31.1)	**(5)**	**CO1**
2A.	Proportion a trapezoidal footing for the two columns of size 0.4m x 0.4m each as shown in Fig. 2A. and calculate the pressure intensity (q_{max} and q_{min}) at both the ends of footing. Take the allowable soil pressure as 160 kN/m^2.	**(3)**	**CO2**
2B.	Explain step by step procedure of conventional design of raft foundation.	**(4)**	**CO2**
2C.	A double under reamed pile is installed in a soft clay deposit. The center of the first bulb is located at a depth of 12m from the ground surface. The spacing between the centers of the bulbs is 3m. The diameter of the pile shaft and the bulb is 1.2m and 204m respectively. Determine the allowable load with a factor of safety of 2.5. Assume c=160 kN/m^2, ca=115 kN/m^2 and α = 0.9.	**(3)**	**CO2**
3A.	A steel circular pile of 650 mm external diameter and 600 mm internal diameter is driven into loose sand to a depth of 15 m under submerged condition having an angle of internal friction of 32°. EI of the pile is 4.2 x 10^5 kN-m^2. Compute the ground deflection of the pile under a lateral load of 300 kN at free head condition. Also calculate the deflection, if the load acts at 3m above GL. Take η_h=5000 kN/m^3. Refer chart Fig. 3A.	**(3)**	**CO3**
3B.	How do you determine the depth of embedment of an anchored cantilever sheet pile wall retaining granular soil and driven in cohesive soil with free earth support?	**(3)**	**CO3**
3C.	Determine the depth of embedment of sheet pile shown in Fig. 3C	**(4)**	**CO3**

4A.	Explain the TVA method for the design of a coffer dam. (With any three stability checks).	**(3)**	**CO4**
4B.	List the favorable and unfavorable soil conditions for soil nailing.	**(2)**	**CO4**
4C.	Check the stability of a cantilever retaining wall retaining a soil having γ=18 kN/m^3, ϕ=30°and δ=240 as shown in Fig. 4C. Assume the allowable pressure as 300 kN/m^2 and unit weight of concrete as 25 kN/m^3.	**(5)**	**CO4**
5A.	Define (a) Frequency ratio (b) Amplitude and explain vibration isolation & control.	**1+2 (3)**	**CO5**
5B.	Explain cyclic plate load test.	**(3)**	**CO5**
5C.	A foundation block of weight 50kN rests on a soil for which the stiffness is assumed as 26000 kN/m. The machine is vibrated vertically by the exciting force of 2.0 sin (30t) kN. Find the natural frequency, natural period, natural circular frequency and the amplitude of vertical displacements. The damping factor is 0.3.	**(4)**	**CO5**

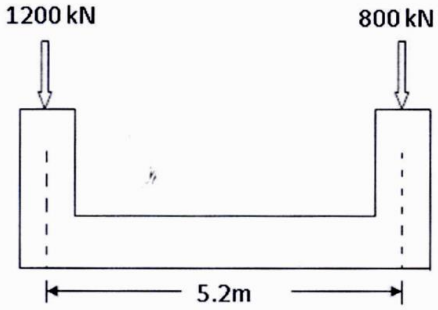

Fig. 2A

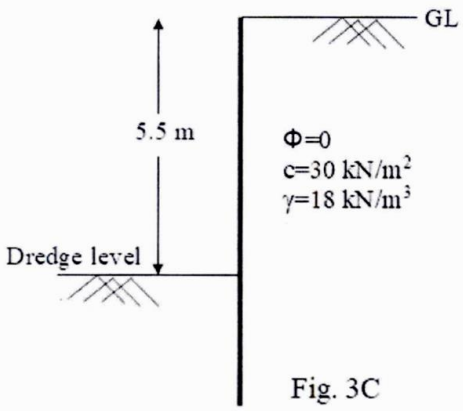

Fig. 3C

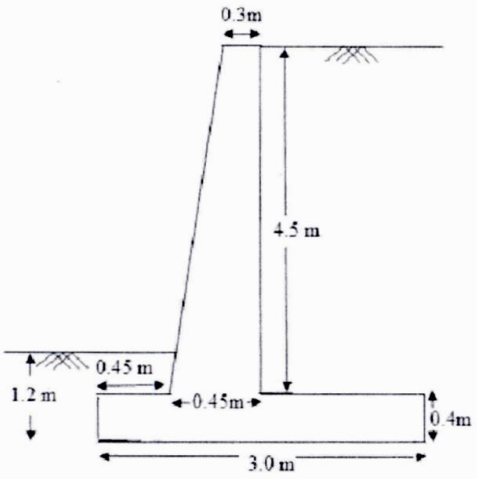

Fig. 4C

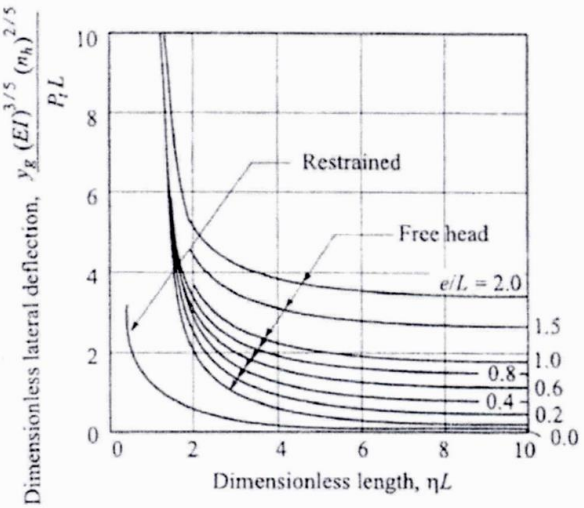

Fig. 3A