B.E. CIVIL ENGINEERING FOURTH YEAR
SECOND SEMESTER EXAM 2018
(1st /2nd Semester/Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual)
SUBJECT: ADVANCED FOUNDATION ENGINEERING
(Name in full)
PAPER xxxx

Time: Two hours/ Three hours/Four hours/Six hours

Full Marks 30/100

(60 marks for this part)

Use a separate Answer-Script for each part

No. of Question	• Maintain neatness and assume reasonable data if it is not supplied.	Marks
	• Answer all questions, All sketches-must be drawn by pencil	

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Part-I

(1) (a) Describe Block Vibration Test with a neat sketch and explain with deduction how C_u can be obtained from the test data — **8**

(b) Design a block foundation from the following data: — **12**

Speed of machine = 500 rpm; unbalanced vertical force = 4.0 $\sin\omega t$, C_u = 3 × 10⁻⁴ kN/ m³, Permissible amplitude = 200 micron, ξ = 0.25

(2) A 5m ×10m deep trench is to be excavated in a clay deposit for the foundation of a multistoried building. The sides of the trench are supported with sheet pile walls fixed in place by struts and wales. The first row of strut is located at 2m below GL and bottom of cut is located at 2m below bottommost row of strut. The vertical spacing of strut is 3.0m and in each row, horizontal spacing of strut is 3m centre to centre along the length of the proposed cut. The soil parameters are as follows: — **20**

γ = 18.5 kN/m³, c = 40 kN/m² and ϕ = 0°

Determine: (a) The pressure distribution on the wall along the depth of cut.

(b) Maximum Bending moment on sheet pile.

(3) A site with a cohesive subsoil deposit (γ = 18 kN/ m³ and C_u= 20 kN/ m²) extending down to 12 m is followed by a stiff clay stratum. A number of stone columns each of 500 mm diameter with centre to centre spacing of 1.2 m are to be installed with triangular pattern at the site. The water table is at a depth of 1.5 m below GL. Determine — **4+(8+8)**

a) Safe bearing capacity of the untreated soil,

b) Load carrying capacity of the stone column based on bulging and also that of the treated ground.

END

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(Name in full)
PAPER ××××

Time: ~~Two hours/~~ Three hours~~/Four hours/Six hours~~   Full Marks ~~30/~~100

(40 marks for this part)

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No. of Question

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• *Answer all questions*, All sketches-must be drawn by pencil

Part-II

(1) (a) What is expansive soil?   2

(b) A drilled pier [refer to Fig. shown] was constructed in expansive soil. The water table was   10
not encountered. The details of the pier and soil are:

L = 6.096m, d= 0.3048 m, L_1 = 1.524 m, L_2 = 4.572 m, p_s = 478.8 kN/m², c_u = 100.02
kN/m², SPT(N) = 25 blows per foot,

Required:

(a) total uplift capacity Q_{up}

(b) total resisting force due to surface friction,

(c) factor of safety without taking into account the dead load Q acting on the
top of the pier,

(d) factor of safety with the dead load acting on the top of the pier

Assume Q = 44.482 kN. Calculate Q_u by Chen's method (assume α= 0.55)
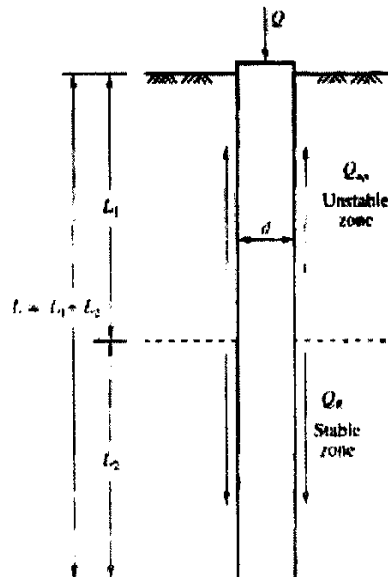
(2) (a) Distinguish between open caisson and pneumatic caisson.   3

(b) Discuss briefly about the different shapes of the well.   3

(c) A circular well of 4.5 m external diameter and 0.75 m steining thickness is embedded up   6+2
to a depth of 13.5 m in a uniform sand deposit. The angle of shearing resistance of sand
and the submerged unit weight are 30° and 1.0 t/ m³ respectively. The well is subjected
to a resultant horizontal force of 60 t and a total moment of 420 tm at scour level.
Assuming the well to be light well, compute the allowable total equivalent resisting force

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due to earth pressure. A factor of safety of 2 may be adopted for soil resistance.
Determine the magnitude and point of maximum bending moment in the well steining.
What will be the change in computed values for a heavy well when the well is assumed to rotate about the base?

(3) (a)   Why dewatering is required?   4

(b)   Describe the sump pumping method of dewatering and also mention the soil for which it is   10
suitable?

END