Ref No.– Ex/CE/T/414/2019

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION, 2019

(4^{TH} YEAR 1^{st} SEMESTER)

(1^{st} / ~~2^{nd}~~ Semester/ ~~Repeat/ Supplementary/Spl. Supplementary/Old/ Annual/ Biannual~~)

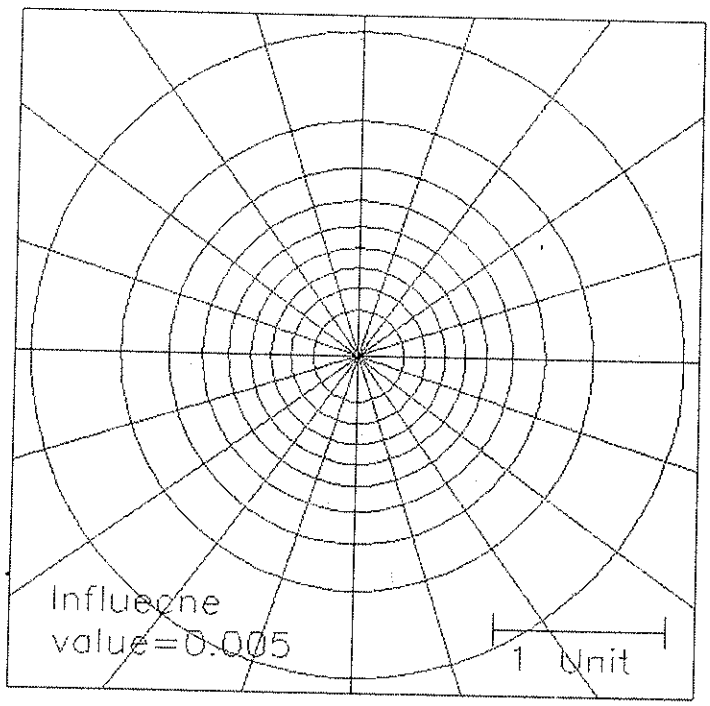
SUBJECT: DESIGN OF FOUNDATION

(Name in full)

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

Full Marks ~~30~~/100

No. of Questions	PART I (60 marks)	Marks
	Answer all questions *Assume reasonable values of data not given*	
Q1	What are rigid and flexible foundations? Give typical examples of both rigid and flexible foundations. Draw the contact pressure diagram for rigid and flexible foundations resting over sandy and clayey deposits.	4+2+4 =10
Q2	An isolated foundation carrying column load of 700kN is to be constructed at a suitable depth in the subsoil deposit as given below: Stratum I : Depth 0 – 3.0m : Brownish grey silty clay / clayey silt γ = 18.6 kN/m^3 , C_u = 40 kN/m^2, $C_c/1+e_0$ = 0.11, p_c = 65kN/m^2, $C_c'/1+e_0$ = 0.04 Stratum II : Depth 3.0 – 15.0m : Dark grey silty clay / clayey silt with decomposed wood γ = 16.0 kN/m^3 , C_u = 12 kN/m^2, $Cc/1+e_0$ = 0.15 Stratum III : Depth 15.0 – 18.0m : Stiff / very stiff bluish / mottled brown silty clay / clayey silt with rusty spots γ = 19.0 kN/m^3 , C_u = 65 kN/m^2, $C_c/1+e_0$ = 0.09 Stratum IV : Depth > 18.0m till 35.0m : Dense / very dense sand γ = 20 kN/m^3, $\varphi = 36^0$ Ground water table at a depth of 1.0m below G.L. Design the foundation. Use Newmark's chart given below for determining vertical stresses below foundation. Assume reasonable values of data not given.	15



Ref No.– Ex/CE/T/414/2019

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION, 2019

(4^{TH} YEAR 1^{st} SEMESTER)

(1^{st} / ~~2^{nd}~~ Semester/~~ Repeat/ Supplementary/Spl. Supplementary/Old/ Annual/ Biannual)~~

SUBJECT: DESIGN OF FOUNDATION

(Name in full)

Full Marks ~~30~~/100

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

No. of Questions	PART I (60 marks)	Marks
Q3	A 50m diameter petroleum storage tank is to be constructed over a sand pad of thickness 1.0m laid over sub-soil deposit similar to that given in Q2. Height of the tank is 10m. Before commissioning, the tank is required to be hydrotested. Self-weight of the tank is 0.5t/ m^2. i. Draw the stress distribution diagram on the horizontal planes through the midpoint of stratum I, II and III during hydrotesting using Newmark's chart given in Q2. ii. Calculate the maximum consolidation settlement at the centre and edge of the tank during hydrotesting. Also draw the settlement profile of the bottom plate of the tank.	15
Q4	A raft foundation is to be constructed for a multistoried building with a total column load of 50000 kN. Size of the raft is 15m x 25m. Use soil data given in Q2. Design the raft foundation considering the following aspects: a. Depth of foundation b. Bearing capacity c. Settlement	20

Ref. No. Ex/CE/T/414/2019

B.E. CIVIL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAM 2019 (1st Semester)

DESIGN OF FOUNDATION

Time: Three Hours

Full Marks 100
(Part I: 60 Marks
Part II: 40 Marks)

Use a separate Answer-Script for each part

Part II (40 Marks)

Question No.

Marks

Assume reasonable values of data, if not supplied
Answer all questions
IS 2911 Part 1 & Part II are allowed.

Q.1

a) Illustrate mechanism of load transfer through piles and distinguish between end bearing piles and friction piles with neat sketches. 3+3=6

b) A subsoil deposit at a site is given as follows:

Stratum	Description	Thickness (m)	"N" value (blows per 30 cm)	Bulk Density (t/m^3)	Natural Moisture Content (%)	Atterberg's Limits		Shear strength parameters		Consolidation
						LL (%)	PL (%)	c (t/m^2)	Φ (degree)	m_v (m^2/t) (pressure range 0.5-1 kg/cm^2)
Top soil	Grey to dark brown, sandy silt with kankar, stone and mica.	1.50	-	-	-	NP	NP	-	-	-
I	Medium brownish grey silty clay.	8.50	10-15	1.85	-	55	21	6.5	0	-
II	Dense brownish grey silty fine to medium	9.00	31-48	1.90	-	NP	NP	0	32	-

B.E. CIVIL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAM 2019 (1st Semester)

DESIGN OF FOUNDATION

Time: Three Hours

Full Marks 100
(Part I: 60 Marks
Part II: 40 Marks)

Use a separate Answer-Script for each part

Part II (40 Marks)

Question No.

Marks

	sand with mica.									
III	Very dense brownish grey silty medium to fine sand with mica and gravel.	16.00	50-93	1.93	-	NP	NP	0	33	-

Consider ground water table is at ground level.

i) Find pile capacity against vertical compression and uplift for RCC bored cast in situ piles of 500 mm, 600mm and 750mm with cut off length of 2m below GL and pile termination depth at 25 mm below GL.

ii) Find lateral load carrying capacity of the 750 mm diameter pile. 8+6+5= 19

Q.2

a) Illustrate "efficiency of a pile group" with the help of a neat sketch. 5

b) A group of nine piles with three piles in a row was driven into soft clay extending from ground level to 15 m below GL. The diameter and length of piles were 500 mm and 15m respectively. The water table is at ground surface and submerged unit weight and undrained cohesion of clay were 9 kN/m^3, and 72 kN/m^2 respectively. Assuming the clay to be normally consolidated with LL=65% determine the capacity and settlement of the pile group. 10