Ref No.– Ex/CE/5/T/307/2017 (Old)

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING(PART TIME) EXAMINATION, 2017

(3RD YEAR 2ND SEMESTER - OLD)

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

SUBJECT: SOIL MECHANICS II

(Name in full)

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

Full Marks ~~30~~/100

No. of Questions		Marks
	Answer all questions (IS codes not allowed)	
Q1	A 7 m retaining wall with a vertical back face retains a homogeneous saturated soft clay. Unit weight of the clay is 18.5 kN/m^3 and undrained shear strength, c_u, of the clay is 35 kPa.	
	a. Draw the variation of Rankine's active pressure on the wall with depth.	6
	b. Find the depth up to which a tensile crack can occur.	4
	c. Determine the total active force per unit length of the wall before and after tensile crack occurs. Also find the location of resultant.	10
Q2	The results of two UU triaxial tests on a typical silty clay soil are as follows: Specimen 1 : σ_3 = 100kPa; $(\sigma_1 - \sigma_3)$ = 250kPa Specimen 2 : σ_3 = 150kPa; $(\sigma_1 - \sigma_3)$ = 340kPa	
	a. Determine the shear strength parameters.	8
	b. Determine the shear stress on the failure plane and indicate theoretical angle of the failure plane	6
	c. Determine the maximum shear stress at failure and inclination of the plane on which it acts. What is the available shear strength on this plane?	6
Q3	A shallow foundation of size 2.5m x 2.5m is to be constructed at a depth of 1.5m below existing ground level. Properties of subsoil down to 10m below G.L. are as follows: Bulk density, γ = 18.4kN/m^3; Angle of shearing resistance, φ = 32^0; Cohesion, c = 0.0.	
	Bearing capacity factors :	
	Φ N_c N_q N_γ 10 9.61 2.69 0.56 15 12.86 4.45 1.52 20 17.69 7.44 3.64 25 25.13 12.72 8.34 30 37.16 22.46 19.13 35 57.75 41.44 45.41	15+5
	Assume ground water table at a depth of 2.0m below G.L. Determine the ultimate and allowable bearing capacity of the foundation using generalized bearing capacity equation. What will be the increase / decrease in factor of safety if water table rises to the G.L.? Give detail calculation indicating how the effect of local shear and variation of water table is considered in the analysis.	

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Full Marks ~~30~~/100

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

No. of Questions		Marks
Q4	A 5m high embankment is to be constructed over a hard clay deposit. Properties of embankment and foundation soil are as follows: Embankment soil : c = 30kpa, $\varphi = 15^0$, $\gamma = 19.5kN/m^3$ Foundation soil : c = 90kpa, $\varphi = 0^0$, $\gamma = 20kN/m^3$ Inclination of the slope : 1.5H:1V. Surcharge over the embankment is 20kPa. Determine the factor of safety of the slope for a typical slip circle touching the foundation clay using method of slices. Give detail calculation.	20
Q5	Write short note on : a. Proctor compaction test b. Standard penetration test and the related corrections c. Direct shear test d. Local and punching shear failure	5 x 4