KATIHAR ENGINEERING COLLEGE, KATIHAR
CIVIL ENGINEERING, 3rd Year (Semester-VI)

Subject: Soil and Rock Mechanics **Instructor: Rashid Mustafa**

Assignment 1

Q.1 Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 kN/m^2 and the pore water pressure is 80 kN/m^2. The effective stress shear strength parameters for the soil are $c' = 16\ kN/m^2$ and $\phi' = 30^0$.

Q.2 In an in situ vane shear test on a saturated clay, a torque of 35Nm was required to shear the soil. The diameter of the vane was 50 mm and length 100 mm. Calculate the undrained shear strength of the clay. The vane was then rotated rapidly to cause remoulding of the soil. The torque required to shear the soil in the remoulded state was 5 Nm. Determine the sensitivity of the clay.

Q.3 An unconfined compression test was conducted on an undisturbed sample of clay. The sample has diameter of 37.5 mm and was 80 mm long. The load at failure measured by the proving ring was 28 N and the axial deformation of the sample at failure was 13 mm. Determine the unconfined compressive strength and undrained shear strength of clay.

Q.4 CU triaxial test conducted on specimens of a saturated clay soil gave the following results

Cell Pressure (kN/m^2)	Additional axial stress (kN/m^2)	Pore water pressure (kN/m^2)
150	102	80
300	200	164
450	304	264
600	405	325

Determine the effective stress strength parameter by the Mohr circle method and the stress point method.

Q.5 An embankment is being built of a soil whose effective shear strength parameters are 100 kN/m^2 and 20^0, unit weight is equal to17 kN/m^3. The pore pressure parameters A and B as determined by the triaxial shear tests are 0.6 and 0.8 respectively. The height of the embankment has just been raised from 5 m to 8 m. Determine the shear strength of the soil at the base of the embankment. It can be assumed that the dissipation of pore pressure during this stage of the construction is negligible and the lateral pressure at any point is one half of the vertical pressure.

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