

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING EXAMINATION, 2017
(3rd YEAR 1st SEMESTER)

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

SUBJECT: SOIL MECHANICS I

(Name in full)

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

Full Marks 30/100

No. of Questions		Marks
<i>Answer all questions</i>		
Q1	<p>(a) For a given soil, $G = 2.67$, Bulk density = 20.5 kN/m^3 and moisture content = 16.7%. Determine,</p> <ol style="list-style-type: none"> Dry density Void ratio Porosity Degree of saturation If degree of saturation is less than 100%, determine additional quantity of water to be added per cubic metre of soil to make it fully saturated. <p>(b) A soil has liquid limit = 68%, plastic limit = 27%, clay content = 34% and natural moisture content = 40%. Compute its plasticity index, liquidity index and activity. Classify the soil according to plasticity chart. Comment on its consistency, strength, compressibility, permeability and shrinkage / swelling characteristics.</p>	<p>10</p> <p>15</p>
Q2	<p>(a) What is quick sand condition? Discuss with neat sketches when it is developed in a soil deposit / mass.</p> <p>(b) What is the role of pore water pressure in governing behaviour of a soil deposit?</p> <p>(c) Subsoil deposit at a particular location consists of a top 4 m thick sand ($w=22\%$, $G=2.67$) followed by a layer of medium silty clay / clayey silt ($w = 28\%$, $G=2.66$) down to a depth of 15m below existing ground level. Ground water table is at a depth of 4m below G.L. Draw the total stress, pore water pressure and effective stress distribution down to a depth of 15m for the soil deposit</p>	<p>7+5+13</p>
Q3	<p>(a) A stratified deposit consists of three horizontal layers of thickness 5m, 4m and 7m respectively. The coefficient of permeability of these layers are 8×10^{-5}, 2×10^{-6} and $5 \times 10^{-5} \text{ cm/sec}$ respectively. Find the average coefficient of of the deposit in vertical and horizontal direction.</p> <p>(b) Draw the flownet for seepage analysis through the foundation soil of a typical gravity dam of height 40m and base width 30m. Thickness of foundation soil is 8m and coefficient of permeability is $4 \times 10^{-3} \text{ cm/sec}$. Determine the seepage through the foundation soil</p>	<p>10+15</p> <p>= 25</p>
Q4	<p>(a) Derive Terzaghi's one dimensional theory of consolidation. Give the solution for degree of consolidation. Show graphically how it varies with time and depth.</p> <p>(b) What is overconsolidation ratio? Explain with the help of a neat sketch how it is determined from $e - \log p$ curve.</p>	<p>15+10</p> <p>= 25</p>