P P SAVANI UNIVERSITY

Forth Semester of B. Tech. Examination

December 2021

SECV2060   Geology & Geotechnical Engineering

10.12.2021, Friday   Time: 12:30 p.m. To 03:00 p.m.   Maximum Marks: 60

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	Attempt the following. (Any Five)	[05]
(i)	Define the term structural geology.	
(ii)	Which mineral has the maximum hardness?	
(iii)	_____ Folds which the originally horizontal strata have been folded downwards.	
(iv)	What is the purpose of seismic refraction method?	
(v)	Which mineral has the minimum and maximum hardness on a Mohr's scale?	
(vi)	Define the epicentre of an earthquake.	
(vii)	The soil transported by river water is called _____.	
Q - 2 (a)	Explain physical properties of minerals.	[05]
Q - 2 (b)	Write short note on sedimentary rocks and its importance.	[05]

OR

Q - 2 (a)	Describe different types of fold.	[05]
Q - 2 (b)	What are the geological considerations of roads and highways?	[05]
Q - 3 (a)	Write down physical properties of any two minerals.	[05]
Q - 3 (b)	Explain the terms: dip and strike with neat sketches. Give the classification of fault.	[05]

OR

Q - 3 (a)	Explain geological consideration for the construction of dam.	[05]
Q - 3 (b)	Define weathering and discuss the any one type of weathering process.	[05]
Q - 4	Attempt any One.	[05]
(i)	What are the objectives of subsoil investigation?	
(ii)	What is the importance of geology in civil engineering?	

SECTION – II

Q - 1	Attempt the following. (Any Five)	[05]
(i)	Define the term: Rock formation.	
(ii)	Define Co-efficient of Permeability.	
(iii)	Write the equation to find coefficient of uniformity and coefficient of curvature.	
(iv)	Define the term: Water content with equation and unit.	
(v)	Which corrections are applied in hydrometer analysis?	
(vi)	If the porosity of a soil sample is 60%, the void ratio is _____.	
(vii)	Write full form of CH, MI, SC, GP, OH, Pt.	
Q - 2 (a)	An undisturbed soil sample has total weight of 2010 gm, volume of 12 cc, water content = 11% and Sp. Gravity G = 2.68. Compute	[05]

      i.   Void ratio
      ii.   Porosity
      iii.   Degree of saturation

iv.   Water content

Effective unit weight

Q - 2 (b) Derive Darcy's law and write down validity of Darcy's law.   **[05]**

OR

Q - 2 (a) Derive $\gamma_b = \frac{(G+e.s_r)}{1+e}\gamma_w$.   **[05]**

Q - 2 (b) A soil sample of height 60 mm and cross-sectional area of 100 cm² was subjected to falling head permeability test. In a time, interval of 6 minutes, the head dropped from 60 cm to 35 cm. If the cross-sectional area of the stand pipe is 2 cm², compute the coefficient of permeability of the soil sample. If the same sample is subjected to a constant head of 20 cm, calculate the total quantity of water that will be collected after flowing through the sample.   **[05]**

Q - 3 (a) A sand layer of 5m thickness is lying over a clay stratum. The W. T is 1.5m below ground level. If the bulk density of saturated sand is 17.66 kN/m³, calculate effective stress and pore water pressure on top of clay layer.   **[05]**

Q - 3 (b) Explain in detail Field Identification of Soil in detail.   **[05]**

OR

Q - 3 (a) Define following terms (Any five).   **[05]**
    i.   Porewater Pressure
    ii.   Capillary water
    iii.   Porosity
    iv.   Permeability
    v.   Discharge velocity
    vi.   Seepage velocity
    vii.   Capillary rise

Q - 3 (b) From following properties classify soil acc. to USCS Classification.   **[05]**
    i.   Passing No.200 sieve 30 %
    ii.   Passing No.4 sieve 70 %
    iii.   LL= 33
    iv.   Ip= 12

Q - 4 Attempt any one.   **[05]**
(i) Explain particle size distribution curve with figure.
(ii) Explain in detail Capillary rise in soil and water .

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