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CMRIT

Internal Assessment Test 1 – November 2021

Sub:	Ground Water and Hydraulics					Sub Code:	18CV734/17CV742	Branch:	CIVIL
Date:	12.11.2021	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VII A & B		OBE

Answer all questions. Assume any missing data suitably. Provide neat sketches wherever necessary	MARKS	CO	RBT
1. a) Distinguish between 'Meteoric Water' and 'Magmatic Water'. b) How groundwater differs from surface waters in terms of flow and quality characteristics?	10	CO1	L1
2. With the help of a neat sketch, describe the vertical distribution of sub- surface water.	10	CO1	L1
3. a) Derive a relationship between Porosity and Void Ratio b) The porosity of a soil sample is 35%. Determine the void ratio of the sample.	10	CO1	L1
4. a) What is the difference between 'Specific Yield' and 'Specific Retention'? b) The porosity, specific yield and specific retention (values in percent by volume) of Gravel and Clay is 20, 19, 1 and 50, 2 and 48 respectively. Comment your observations on this data.	10	CO2	L2
5. Write short notes on: a) Juvenile water b) Aquifuge c) Confined Aquifer and d) Artesian Aquifer	10	CO1	L1

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Scheme and Solution: 18CV734/17CV742

Ground Water Hydraulics

IAT – 1 Date: 12.11.2021

1. a) Meteoric Water : Derived from atmosphere, precipitation, rain or snow; participating in hydrologic cycle **[2.5 Marks]**

Magmatic Water: Derived from melting of rocks; water present in rock melt – hot springs in volcanic regions is of magmatic origin – contain volatile elements, high in Cl, Fl, Bo and high lithium to sodium ratio **[2.5 Marks]**

b) Groundwater – Limited flow at any point, pumped, mineralized, minor flood control value, constant temperature (uniform), no evaporation loss **[2.5 Marks]**

Surface Water – Large flows, available in gravity, low mineral content, Maximum flood control value, fluctuating temperature, high evaporation loss **[2.5 Marks]**

2. Sketch – [**05 Marks]**

Description: Zone of Aeration; Zone of Saturation; Groundwater or Phreatic Water; Capillary Zone; Intermediate Vadose Zone; Soil – Water Zone **[05 Marks]**

3. a) Derivation: Porosity n = Volume of Voids, Vv/Total Volume, V= Vv/(Vv + Vs) = (Vv/Vv) /! + Vs/Vv) = 1/(1 + 1/e) = e/(1 + e) **[05 Marks]**

b) Problem: Porosity n = 0.35; Void Ratio e = n/(1-n) = 0.35/(1-0.35) = 0.54 **[05 Marks]**

4. a) Specific Yield of Soil or Rock is the ratio of the volume of water that after saturation, can be drained by gravity to its own volume **[2.5 Marks]**

Specific Retention of Soil or Rock is the ratio of the volume of water it will retain after saturation against the force of gravity to its own volume **[2.5 Marks]**

b)

	Porosity	Specific Yield	Specific Retention
Gravel	20	19	1
Clay	50	2	48

Comment – Although gravel has low porosity due to the larger grain size, the yield is very high as compared to clay which has very high water retention capacity. Gravel and Sand constitute good aquifers **[05 Marks]**

5. Juvenile Water derived from interior of earth – not previously been a part of hydrosphere **[2.5 Marks]**

Aquifuge is relatively impermeable formation neither containing nor transmitting - neither porous nor permeable, cannot store and same time cannot permit water through it **[2.5 Marks]**

Confined Aquifer: pressure aquifers – Groundwater is confined under pressure greater than atmosphere by overlying relatively impermeable strata **[2.5 Marks]**

Artesian Aquifer: Derived from French artesein meaning “of or pertaining to artois, the northmost province of france. Here the first deep wells to tap confined aquifers were drilled and investigated from about 1750, originally the term referred to a well with freely flowing water, but at present it is applied to ay well penetrating a confined aquifer or simply the aquifer itself **[2.5 Marks]**