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**Reg. No. :**

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**Question Paper Code: 96A03**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Sixth semester

Agriculture Engineering

19UAG603- Ground Water and Well Engineering

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The net water balance equation can be written as CO1- U  
(a)  $P-Q-E-T-G = \Delta S$  (b)  $P-Q+E+T-G = \Delta S$  (c)  $Q- P-E+T-G = \Delta S$  (d)  $P+Q+E+T+G = \Delta S$
2. Water that is derived from volcanic eruptions and found in deep layers is CO1- U  
(a) Connate water (b) Magmatic water (c) Metamorphic water (d) Volcanic water
3. Darcy's law states that: CO2- App  
(a)  $v = Ki$  (b)  $v = K/i$  (c)  $v = K+i$  (d)  $v = K-i$
4. The entrance velocity near the well screen should not exceed: CO1- U  
(a) 1-2 cm/s (b) 2-3 cm/s (c) 3-6 cm/s (d) 8-10 cm/s
5. The thickness of gravel pack surrounding the well screen should be CO1- R  
(a) 5-10 cm (b) 10-20 cm (c) 20-30 cm (d) 40-50 cm
6. .... is a horizontal perforated or porous with open joints CO1- R  
surrounded by a gravel filter  
(a) Infiltration Gallery (b) Collector Wells (c) Well screens (d) Tube wells
7. Air drilling is especially suitable for ..... CO1- U  
(a) Lime stone (b) Sand stone (c) Botha & b (d) None of the above
8. .... is the process which causes reversals of flow through the screen openings CO1- U  
so as to wash the fines and rearrange the formation materials  
(a) Well revitalization (b) well development  
(c) Well completion (d) well disinfection

9. The fresh water-sea water interface has a ..... shape CO1- R  
 (a) Parabolic (b) elliptical (c) Circular d) None of the above
- 10 Which among this is not an improved Land and Watershed Management practice CO1- R  
 for artificial recharging?  
 (a) Contour Bunding b) Contour Trenching c) Bench terracing d) Vertical shafts

PART – B (5 x 2= 10 Marks)

- 11 Classify the aquifer types? CO1- U
- 12 List out the parameter affecting partial penetration of wells CO1- U
- 13 Differentiate dug wells and tube wells. CO1- R
- 14 List out the various methods for drilling of wells. CO1- U
- 15 State Ghyben Herzberg equation for salt water intrusion and explain the terms? CO2- App

PART – C (5 x 16= 80 Marks)

- 16 (a) Compare and contrast the water bearing properties of rocks and soils CO3- App (16)  
 Or  
 (b) Elaborate the source of ground water? CO2- App (16)
- 17 (a) Derive the steady state groundwater flow equation for confined and CO2- App (16)  
 unconfined Aquifers with neat sketch  
 Or  
 (b) Explain partial penetration of wells with neat sketch CO2- App (16)
- 18 (a) Describe the design of collector wells CO2- App (16)  
 Or  
 (b) From the pumping tests of a semi-confined aquifer of thickness 30m CO2- App (16)  
 and permeability 20m/d, it is estimated that the recharge rate from an  
 overlying unconfined aquifer through an aquitard of thickness 2 m is,  
 50mm/year. The average piezometric surface in the semi-confined  
 aquifer is 16m below the water table in the unconfined aquifer.  
 Determine the hydraulic characteristics of the aquitard (semi-  
 confining layer) and the aquifer.
- 19 (a) A Explain and differentiate well development, well completion and CO2- App (16)  
 well disinfection.  
 Or  
 (b) Elaborate the various pumping equipment used for well. CO1-R (16)

- 20 (a) List out the hazardous substances in groundwater and explain dose-response Analysis and risk assessment. CO1- U (16)
- Or
- (b) Explain the Sea water intrusion with neat sketch CO2- App (16)

