**A** **Reg. No. :** | | | | | | | | | | | | |

# Question Paper Code: UA302

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Agricultural Engineering

21AGV302-GROUND WATER AND WELL ENGINEERING

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The upper surface of the zone saturation called as _____ CO 1 U

(a) Aquifer (b) Aquiclude (c) Water table (d) Aquifuge

2. In the expression T = Kb, T denotes_____ of the aquifer. CO 1 U

(a) Storativity (b) Transmissibility

(c) Hydraulic conductivity (d) None of the above

3. Darcy's law states that: CO 1 U

(a) v = Ki (b) v = K/i (c)v = K+i (d) v = K-i

4. In most of the confined aquifers,the value of storage coefficient ranges between _____ CO 1 U

(a) 0.05 to 0.0005 (b) 0.5 to 0.005 (c) 0.00005 to 0.005 (d) 0 to 5

5. ____ type of well screen have openings in the form of shutter CO 1 U

(a) Louver type b) Continuous type (c) V-shaped d) Slotted screen

6. Which among this is not a corrosion resistant screening material for wells? CO 1 U

(a) Steel b) Alloys c) Stainless steel d) Brass

7. …….. is a method of drilling which uses a high velocity stream of water for drilling a well. CO 1 U

(a) Boring (b) Driving (c) ) Jetting (d) Cable tool percussion drilling

8. Air drilling is especially suitable for …….. CO 1 U

(a) Lime stone (b) Sand stone (c) Both (a) & (b) d) None of the above

9. The fresh water-sea water interface has …… shape CO 1 U

(a) Parabolic (b) elliptical (c) Circular (d) Triangular

10. A clean well should be located _____away from potential sources of contamination to avoid bacterial contamination. CO 1 U

(a) 10 m (b) 50 ft (c) 15 m (d) Both (a) and (b)

PART – B (5 x 2= 10 Marks)

11. Define Transmissivity. CO1 U

12. Write the Dupuit's equation for steady state groundwater flow of confined aquifer? CO1 U

13. List out the materials for well screens CO1 U

14. Draw a neat sketch of pull back method of well screen. CO1 U

15. Why artificial recharge required in maintain the water table? CO1 U

PART – C (5 x 16= 80 Marks)

16. (a) Explain Electrical Resistivity method of investigation groundwater exploration. CO1 U (16)

Or

(b) How do the seismic refraction method and the geologic method contribute to groundwater exploration? CO1 U (16)

17. (a) A 30 cm well completely penetrates a confined aquifer of permeability 45m/day. The length of strainer is 20 m under steady state of pumping the drawdown at the well was found to be 3.0 and radius of influence was 300m CO2 App (16)

i) Calculate the discharge.
ii) If the well diameter is 45 cm then find the discharge.
iii) If the drawdown is increased to 4.5m then find the discharge

Or

(b) A 30cm well penetrating a water table aquifer is pumped at the rate of 3800 lpm. Initial saturated thickness of the aquifer is 8.2m. 18-day pumping test were conducted and the drawdown values at the end of 18 days in 6 observation wells (3 on a line extending north from the pumped the well and 3 to the south) are given in table. Determine the aquifer constants T and S. If the observed drawdown in the pumped well is 4.5m after 18 days determine the well efficiency. CO2 App (16)

| Line | Well No | Distance from the pumped well, r(m) | Observed drawdowns after 18 days, s(m) |
|---|---|---|---|
| N | 1 | 15.0 | 1.80 |
| | 2 | 30.7 | 1.40 |
| | 3 | 57.7 | 1.04 |
| S | 1 | 14.9 | 1.67 |
| | 2 | 30.6 | 1.31 |
| | 3 | 57.9 | 1.19 |

18. (a) A 30 cm tube well was drilled in an area the GWT varies between 10 m in monsoon to 15 m in summer, bgl. A preliminary test showed that the well can yield 2500 lpm with a drawdown of 5 m. The average permeability of the sandy strata may be taken as 30m/day. Determine the length of the strainer required. Assume a radius of influences of 300 m, entrance velocity of 25mm/sec and 16% of open area. If the water have to be lifted to a height of 30 m agl what is the power of the pump required.Assume total losses of 5 m and pump efficiency of 60%. What is the month electricity bill at Rs.2 per kW hr (kwh) assuming a motor efficiency of 85 % and 12 hr of pumping per day? CO3 App (16)

Or

| | | | | |
|---|---|---|---|---|
| | (b) | The GWT varies between 10 m in monsoon to 15 m in summer, bgl for a 40 cm tube well was drilled in an area. A preliminary test showed that the well can yield 2800 lpm with a drawdown of 7 m. The average permeability of the sandy strata may be taken as 40m/day. Determine the length of the strainer required. Assume a radius of influences of 400 m, entrance velocity of 30mm/sec and 18% of open area. If the water have to be lifted to a height of 40 m agl what is the power of the pump required. Assume total losses of 7 m and pump efficiency of 60%. What is the month electricity bill at Rs.3 per kW hr (kwh) assuming a motor efficiency of 85 % and 12 hr of pumping per day? | CO3 App | (16) |
| 19. | (a) | You're installing a well screen in a newly drilled well to ensure effective water extraction and prevent sediment from entering the well. Explain how you would choose the most appropriate method for well installation. | CO3 App | (16) |
| | | Or | | |
| | (b) | With neat sketch explain in detail about different types of open wells. | CO3 App | (16) |
| 20. | (a) | Discuss in detail about the sources of contamination of groundwater. | CO1 U | (16) |
| | | Or | | |
| | (b) | Explain the process of hydrological cycle in detail with neat sketch. | CO1 U | (16) |