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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year II Semester Supplementary Examinations July-2021**  
**HYDROLOGY, GROUND WATER AND WELL ENGINEERING**  
(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- |   |   |  |    |
|---|---|--|----|
| 1 | a | Describe the hydrological cycle.                               | 2M |
|   | b | Explain the global distribution of water.                      | 2M |
|   | c | Briefly explain about the groundwater chemistry.               | 2M |
|   | d | Explain hydrodynamic dispersion and coefficient of dispersion. | 2M |
|   | e | Briefly, explain about the Darcy's law with neat diagram.      | 2M |

**PART-B**

(Answer all Five Units 5 x 10 = 50 Marks)

**UNIT-I**

- |   |   |   |    |
|---|---|---|----|
| 2 | a | Define precipitation and what are the major forms of precipitation. | 5M |
|   | b | Describe the different methods of recording of rainfall data.       | 5M |

**OR**

- |   |   |   |    |
|---|---|---|----|
| 3 | a | Explain about the different methods of measurement of rainfall. With neat diagram.          | 5M |
|   | b | Define recording type of rain gauge and explain the types of recording type of rain gauges. | 5M |

**UNIT-II**

- |   |   |  |    |
|---|---|--|----|
| 4 | a | Define aquifer and explain the classification of aquifers. | 5M |
|   | b | Explain the classification of saturated zone.              | 5M |

**OR**

- |   |   |   |    |
|---|---|---|----|
| 5 | a | Briefly explain about the properties of aquifer.  | 5M |
|   | b | Distinguish between: (i) Aquifer and Aquitard (ii) Aquifuge and Aquiclude<br>(iii) Unconfined aquifer and artesian aquifer (iv) Artesian aquifer and leaky aquifer<br>(v) Permeability and Hydraulic conductivity | 5M |

**UNIT-III**

- |   |   |  |    |
|---|---|--|----|
| 6 | a | Define salinity and explain the classification of groundwater composition based on total dissolved solids content? | 5M |
|   | b | Briefly discuss about the origin and movement of groundwater.  | 5M |

**OR**

- |   |   |  |    |
|---|---|--|----|
| 7 | a | Explain the water quality standards and list out the different water quality parameters based on FEPA and WHO standards? | 6M |
|   | b | Define saline intrusion and mechanism responsible for saline water intrusion.  | 4M |

**UNIT-IV**

- |   |   |   |    |
|---|---|---|----|
| 8 | a | Briefly explain about initial and boundary condition. | 6M |
|   | b | Briefly explain about artificial recharge techniques. | 4M |

**OR**

- |   |   |  |    |
|---|---|--|----|
| 9 | a | Explain groundwater pollution and legislation.     | 5M |
|   | b | Explain solution of advection dispersion equation. | 5M |



## UNIT-V

10 a Derive the equation of unsteady state flow of groundwater.

5M

b

5M

Drawdown was measured during a pumping test at frequent intervals in an observation well 200 feet from a well that was pumped at a constant rate of 500 ppm. The data for this pump test is listed in table. These measurements shows that the water level is still dropping after 4000 minutes of pumping, therefore analysis of the test data requires use of the Theis non-equilibrium procedure. Determine S and T for this aquifer.

Pump test data	
Time (min)	Drawdown ( feet)
1	0.05
2	0.22
3	0.40
4	0.56
5	0.70
7	0.94
10	1.2
20	1.8
40	2.5
100	3.4
300	4.5
1000	5.6
4000	7.0

OR

11 a A well penetrating a confined aquifer is pumped at a uniform rate of 2500 m<sup>3</sup> /day. Drawdown during the pumping period are measured in an observation well 60 m away; observations of "t" and "s" are listed in table. Using the This method determine T and S for this confined aquifer.

5M

Pumping test data					
t(min)	S(m)	r <sup>2</sup> /t(min)	T(min)	S(m)	r <sup>2</sup> /t(min)
0	0	∞	18	0.67	200
1	0.2	3600	24	0.72	150
1.5	0.27	2400	30	0.76	120
2	0.30	1800	40	0.81	90
2.5	0.34	1440	50	0.85	72
3	0.37	1200	60	0.90	60
4	0.41	900	80	0.93	45
5	0.45	720	100	0.96	36
6	0.48	600	120	1.00	30
8	0.53	450	150	1.04	24
10	0.57	360	180	1.07	20
12	0.60	300	210	1.10	17
14	0.63	257	240	1.12	15

b Briefly, explain about the slug test procedure of an aquifer.

5M

\*\*\*END\*\*\*