



The Open University of Sri Lanka  
Faculty of Engineering Technology  
Bachelor of Industrial Studies Honors (Agriculture)  
Final Examination- 2020/2021  
AGI6478/AGX6535 Hydrology and Water Resources

Date : 19-01-2022  
Time : 14.00-17.00 hours

**SECTION 2: Answer any four (04) questions. All questions carry equal marks.**

1. (a). Briefly describe the components of Hydrograph.

(b). The 4-hour unit hydrograph for a 550 km<sup>2</sup> catchment is given below. An uniform-intensity storm of 4 hours' duration with an intensity of 6 mm/h is followed after a 2 hour break by a further uniform-intensity storm of 2 hours duration and an intensity of 11mm/hr. The rain loss is estimated at 1mm/hr on both storms. Base flow was estimated to be 10m<sup>3</sup>/s at the beginning of the first storm and 40m<sup>3</sup>/s at the end of the runoff period of the second storm. Compute the likely peak discharge and its time of occurrence.

Hours	Q m <sup>3</sup> /s	Hours	Q m <sup>3</sup> /s
0	0	12	62
1	11	13	51
2	71	14	40
3	124	15	31
4	170	16	24
5	198	17	17
6	172	18	11
7	147	19	5
8	127	20	3
9	107	21	0
10	90		
11	76		

2. (a). Differentiate between **unconfined** aquifer and a **confined** aquifer?
- (b). Briefly describe the pumping test procedure and its importance in groundwater
- (c). A well is pumped at a rate of  $2000\text{m}^3/\text{day}$  for 3 hrs. The drawdown in an observation well 120m away is measured with time and is given below. Calculate the transmissivity and storage coefficient of the aquifer using Cooper & Jacob's equation

Time since pump started (minutes)	Drawdown (m)	Time since pump started (minutes)	Drawdown (m)
1	0.05	18	0.55
1.5	0.08	24	0.61
2	0.11	30	0.65
2.5	0.15	40	0.69
3	0.16	50	0.73
4	0.20	60	0.76
5	0.24	80	0.79
6	0.28	100	0.83
8	0.35	120	0.87
10	0.40	150	0.91
12	0.43	180	0.95
14	0.46		

3. (a). Briefly explain the important physical, chemical and biological properties of water and also explain how you would measure them.
- (b). List the common pollutants which lead to reduce surface water quality.
- (c). Briefly describe the possible sources of contamination of groundwater and describe what steps you would take to minimize the contamination.
4. (a). Briefly explain and compare the aquifer yields in unconsolidated materials, sedimentary rocks and crystalline rocks.
- (b). A cofferdam is built for the construction of a dam. The construction period is 2 years. A plot of annual peak flows against probability for the river flows showed that  $10000\text{ m}^3/\text{s}$  would be exceeded 10% of the time. What is the chance that  $10000\text{ m}^3/\text{s}$  would be exceeded in the 2 years?

5. (a). Briefly explain the different types of wells available in Sri Lanka and its advantages and disadvantages.

(b). A well in a confined aquifer of thickness of  $D$  is pumped at a rate of  $Q$ . Diameter of the well is  $r_0$ , water level in the well is  $h_0$  and the height of rest water level is  $H$  above datum. Neglect well losses. Take hydraulic conductivity as  $k$ . Derive an expression for the height of water table at a distance from the centre of the well. Assume steady state conditions.

6. Write brief note on any three (03) of the following

- (b) Siting of rain gauge
- (c) Infiltration indices
- (d) Aquifer particle size analysis
- (e) DRASTIC method

.....END OF PAPER.....

