



The Open University of Sri Lanka
 Faculty of Engineering Technology
 Bachelor of Industrial Studies (Agriculture)
 Final Examination- 2015/2016
 AEX6235/AEI6235 Hydrology and Water Resources

Date : 01-12-2016
Time : 0930-1230 hours

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

1. (a) Briefly explain the siting of a rain gauge.
 (b)(i) Explain briefly how to estimate the missing rainfall data.
 (ii) Precipitation station X was inoperative for part of a month during which a storm occurred. The respective storm totals at three surrounding stations A, B, and C was 110, 98 and 120mm. The normal annual precipitation amounts at stations X, A, B and C are respectively 950, 1100, 905 and 1250. Estimate the storm precipitation for station X.
2. (a) Briefly explain the types of correlation used Hydrological studies.
 (b) Following is the frequency table of the River flow. Calculate the standard deviation and coefficient of variability.

X mid point	Frequency
6.95	3
10.95	5
14.95	7
18.95	6
22.95	3
26.95	1

3. (a) Briefly describe the components of Hydrograph

(b) The 4-hour unit hydrograph for a 550 km² catchment is given below. A 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 11 mm/hr. The rain loss is estimated at 1 mm/hr on both storms. Base flow was estimated to be 10 m³/s at the beginning of the first storm and 40 m³/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 ³ /s	Hours	Q m ³ /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		

4. (a) Briefly explain the types of current meters used in stream gauge measurements.
- (b) Compute the discharge of the stream whose current meter measured data are given below.

Distance (m)	0	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6
Depth(d) in m	0	0.3	1.2	2.1	2.5	2.2	1.6	1.4	1.0	0.6	0.4	0
Velocity (m/sec) at 0.2d	0	0.4	0.5	0.7	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0
Velocity (m/sec) At 0.8d	0	0.2	0.3	0.5	0.6	0.3	0.5	0.4	0.3	0.3	0.3	0

5. (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		

6. (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.

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