The Open University of Sri Lanka

Faculty of Engineering Technology

Degree in Industrial Studies (Agriculture)

Final Examination- 2009/2010

AEI6235 Hydrology and water resources

Date   : 11-03-2010
Time   : 0930-1230 hours

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

1. Precipitation data for a 36-hour storm period recorded at 14 stations is as follows.

Station	Latitude		Longitude		Rainfall depth
	Degrees	minutes	degrees	minutes	(mm)
A	350	23'	910	46'	32
B	330	32'	900	22'	75
C	310	45'	930	26'	160
D	300	24'	920	35'	42
E	310	51'	910	40'	80
F	330	30'	940	40'	35
G	340	56'	900	24'	45
H	340	27'	910	31'	80
I	330	10'	930	09'	101
J	310	07'	940	33'	48
K	330	36'	910	28'	158
L	320	45'	930	10'	201
M	320	14'	900	16'	30
N	320	28'	920	20'	205

(a) Plot the location of the stations and the precipitation data and draw an Isohyetal map at 50 mm interval. Assume the storm boundary to be the 50 mm isohyet and compute the average rainfall by the isohyetal method.

(b) Further, assume that the 50 mm isohyet is the watershed area boundary and then draw Thiessen polygons for each station. Compute the average

2. (a) Briefly explain the zone of aeration and saturation with a suitable sketch
    (b) What is groundwater recharge and explain its importance on sustainable groundwater resources management using suitable example from Sri Lanka

3. (a) Derive the Theim equation for a steadily flowing well in a confined aquifer under equilibrium conditions as given below (with standard notation)

$$Q = \frac{2\pi kb[H - H_0]}{\ln R / r_w}$$

(b) A well with a diameter of 200 mm in a confined aquifer with a thickness of 10 m is pumped at a steady rate of 30 l/minute. The drawdown at the pumping well is 2 m below ground level and the drawdown at an observation well 500 m away is 0.5 m. Assuming the ground to be flat and equilibrium conditions determine the transmissivity of the aquifer.

4   (a) Briefly explain quality standards for irrigation water
    (b) Write a brief account on the salt water intrusion as one way of groundwater contamination

5. (a) Write a brief note on Driven and jetted tube wells
    (b) Briefly describe the factors that you consider while designing the tube well

6. (a) Write a short essay on "River abstractions and Spring water tapping" using clearly labelled diagrams wherever necessary to fortify your essay.
    (b) Briefly describe the design and construction of open wells