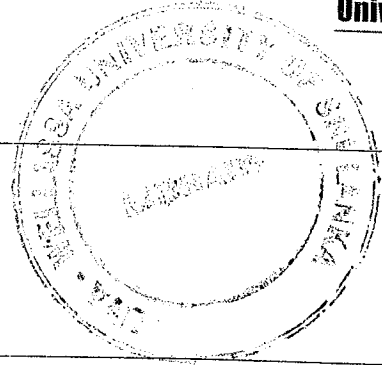


MRT 351-1 Hydrology



**Instructions to candidates**

Duration: One (01) hour

Number of questions: Two (02) Essay

Answer all questions

Mark allocation: 100 Mark

1. Mean Annual Rainfall values in mm for Bandarawela from year 1992 to 2015 are 2750, 2485, 2310, 2215, 2125, 2010, 2215, 2100, 2700, 2545, 2485, 2040, 2215, 2300, 2270, 2485, 2640, 2545, 2350, 2690, 2780, 2080, 2485 and 2545 respectively.
- a. Determine the 75% probability rainfall value in mm. (10 mark)
  - b. What is the rainfall value in mm that occurs once in 4 years? (05 mark)
  - c. What is the probability to have a rainfall of 2000 mm or above? (05 mark)
  - d. What is the probability to have a rainfall less than 2500 mm? (05 mark)
  - e. What is the recurrence interval of 2500 mm rainfall? (05 mark)

- 2.
- a. What is the time of concentration of a watershed? (02 mark)
  - b. What are the three types of runoff? (03 mark)
  - c. The observed outflows in a stream from a watershed of 1.098 km<sup>2</sup> due to a storm of 3-hour duration are given in the table.

Time	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.
Flow (m <sup>3</sup> /hour)	15	30	51	76	61	40	15

- i. Determine the equivalent depth of direct runoff. (05 mark)
- ii. Derive the 3-hour unit hydrograph. (05 mark)
- iii. What will be the outflow hydrograph for 2-hour storms of 13 mm and 7 mm started at 5 a.m. and 8 a.m. respectively? (45 mark)
- iv. Derive the 4-hour unit hydrograph using lagging storm method. (10 mark)

(State assumptions you made in solving this problem)