UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE IN FISHERIES AND MARINE SCIENCE DEGREE

Level III Semester II Examination

January 2017

LIM 3261 Statistical Hydrology

Time 1 hour and 15 minutes

Answer for all questions

Part I (20 marks)

Select the correct answer

1. Variability of a data set is represented by
   a. Mean
   b. Standard Deviation
   c. Mode
   d. Median

2. Weibul formula is
   a. $P = \frac{m}{N+1}$
   b. $P = \frac{m+N}{N+1}$
   c. $P = \frac{N}{m+1}$
   d. $P = \frac{m}{N+m}$

   (N = number of yecrs of records, m= rank, P = Probability, T= return nperiod)

3. Degree of symmetry in the data about the mean is expressed by
   a. Standard Deviation
   b. Coefficient of Variation
   c. Skewness
   d. Variance

4. The maximum annual floods for a river were statistically analyzed for 93 years. The average maximum annual floods and the standard deviations are 14210 cfs and 9700 cfs respectively. What is the coefficient of variation of this data set?
   a. 1.34
   b. 1.46
   c. 0.51
   d. 0.68

5. Empirical models are
   a. Developed after analyzing a small ~~large~~ data set
   b. Statistical relationships between inputs and out pu
   c. Applicable to wide geographical regions
   d. Theoretical or process-based models

Part II (30 marks)
Write your answers only within the provided space

1. What is the importance of statistical analysis in hydrological studies?

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(5 marks)

2. Define continues data, discrete data and pulse data?
   i. Continues data:.....
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   ii. Discrete Data: .....
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   iii. Pulse data.....
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(5 marks)

3. Briefly describe the difference between complete duration series and partial duration series

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(4 marks)

4. The average annual rainfall of station P, Q, R and S are 75 cm, 84 cm, 80 cm and 78 cm respectively and the rainfall of P, Q and R during a storm period are 8.5 cm, 6.7 cm and 9,0 cm respectively. The rainfall of the station S during this storm is missing. Calculate the missing rainfall data for the station S

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(6 marks)

5. What are the possible reasons to get inconsistent records from a rain gauge?

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(5 marks)

6. What is the importance of modeling in hydrological studies?

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(5 marks)

Part III (50 marks)
Answer all questions

a. A small shallow freshwater lake has one meter water level, and the primary production of this system is mainly performed by submerged aquatic plants and phytoplanktons. Phytoplankton community consists of diatoms, green algae, and blue green algae and these phytoplantons are highly grazed by zooplanktons. Few planktivorous fish species have also been found in the lake. The bottom of the lake consists of muddy sediments which supports for different benthic invertebrates and aquatic plants. Nutrient levels of the water column (NO_3^- and PO_4^{3-} and NH_4^+) are optimum for the plant growth and there is no risk of eutrophication.

Suppose you have been appointed to develop a conceptual model diagram to model macrophyte-nutrient-phytoplankton interaction for the above shallow lake. By considering all possible components and linkages, prepare a conceptual model diagram relevant to your task.

b. If a structure has a life period of 50 years, and if you accept 10% risk of this being flooded during its life time, what is your designed return period of this structure?