

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2017 - 18 Examination

Semester: 2
Subject Code: 03214152
Subject Name: Hydrologic Modelling

Date: 21/05 /2018
Time: 2.00 pm to 4.30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 (A) Following are the viscosity readings on a mixture of raw material :
 22.02 , 23.83 , 26.67 ,25.38 ,25.49, 23.50 ,25.90and 24.98 . **(05)**

Illustrate the Box plot for the mixture- viscosity data.

(B) If a random variable has the standard normal distribution , find the probability that it will take on a value : **(05)**

i) less than 2 , ii) less than – 1.40 , iii) greater than 2.84 , iv) greater than – 1.80 .

(C) Fill in the blanks :

a) A time series consists of two general types of variations _____ .

b) Both types of variation must be _____ in order to formulate a model that can be used to predict or synthesize expected values and future events.

c) An upward-sloping trend due to urbanization or the annual variation of air temperature could be modelled as _____ . **(05)**

d) Time series modelling that relies on the analysis of data involves four general phases.:

_____ .

Q.2 Answer the following questions. (**Attempt any three**) **(15)**

A) Formulate a rainfall runoff model assuming the values of k and p_0 with the help of the following data :

Rainfall , cm : 29.8 , 12.1 ,18.5 , 11.4 , 6.6 , 10.6 , 9.2 , 10.58 , 1.1 , 0.85 , 8.85 and 21.03

Runoff , cm: 15.9 , 9.1 , 10.7 ,10.9 ,7.8 , 5.8 , 3.5 , 2.83, 1.65 , 1.38 , 2.1 and 5.13

B) Validate the above model by RMSE

C) Validate the above model by Refined index of agreement

D) Validate the above model by Theil's U index of inequality

Q.3 A) The following data measured from 18 debris in Narmada river were subjected to a Dixon–Thompson test : **(07)**

700 , 690 , 670 , 800 , 339 , 160 , 1039 , 1192 , 630 , 1120 , 664 , 30 , 1240, 150 , 730 , 203 , 571 , 190 m³ / Km² .

Evaluate the data for either a low or high outlier while assuming a normal distribution.

Q.3 B) Consider the time series X_t given in the second row of the following data : **(08)**
t : 1 , 2 , 3 , 4 , 5 , 6 , 7
 X_t : 9 , 8 , 10 , 9 , 11 , 10 , 13
Which has a sample size of 7 . Compute the lag – 1 autocorrelation coefficient .

OR

Q.3 B) W r t data given in Q . 3 (B) , compute the lag – 2 autocorrelation coefficient . **(08)**

Q.4 A)W r t the following data what is the probability of having the maximum flood having 100 **(07)**
years event ?
21300 , 17200 , 14400 , 13300 , 12700 , 10200 , 9440 , 9110 , 8490 , 8150 , 7400 , 7180 , 6730 ,
6670 , 6550 , 6040 , 6000 , 6150 , 6730 , 7220 , 7580 , 8400 , 8650 , 9360 , 9900 , 11400 , 13100 ,
13500 , 15000 , 19100 cumec .

OR

Q.4 A) W r t data in Q. 4 (A) What is the probability of having a flood of 12000 cumec ? **(07)**

Q.4 B) Discuss moving average filtering in time series analysis **(08)**