B.Sc. Examination, 2022
Semester-V
Statistics
Course: DSE-1
Time series Analysis

Time: 3 hrs Full Marks:40

Answer **all** questions.

1. Choose out the correct alternative for the following questions.
   (a) The null hypothesis on Portmanteau test is
      i. time series observations are nonrandom.
      ii. residuals are nonrandom.
      iii. residuals are random observations.
      iv. residuals are autocorrelated.
   (b) The following linear process $X_t - .8X_{t-1} - .4X_{t-2} = Z_t$ is
      i. stationary but not invertible
      ii. not stationary but invertible
      iii. stationary and invertible
      iv. neither stationary not invertible
   (c) Partial auto correlation function of $X_t = .7X_{t-1} + .2X_{t-2} + Z_t$ will be
      i. insignificant after lag 2
      ii. zero after lag 2
      iii. infinite
      iv. significant only for lag 2
   (d) For Holt Winters method when do you think that nonseasonal model will be befitting?
      i. seasonal weight near to 0
      ii. seasonal weight near to trend weight
      iii. seasonal weight near to .5
      iv. seasonal weight near to 1.
   (e) In a moving average method of extent 8, applied on 50 time observations, how many values are left to be unestimated in total?
      i. 4
      ii. 5
      iii. 8
      iv. 9

5

2. Write out True/False for the following statements.
   (a) Autocorrelation function is asymmetric.
   (b) For the time series model $X_t = .2X_{t-1} - .7X_{t-2} + Z_t$ where Z_t is white noise process, autocorrelation function is damped exponential.
   (c) Reciprocal of logistic function is modified exponential.
   (d) The distribution of forecasting errors might be nonrandom sometimes.
   (e) To initialize Holt-Winter forecasting method in a quarterly data one need to have at least one complete data.

5

3. Answer in one sentence.

   (a) Name a method for eliminating cyclical fluctuation.
   (b) Give one example of indirect cost occurred during forecasting.
   (c) When do you use ratio to moving average method for deseasonalization?
   (d) How do you determine the period of moving average?
   (e) State one advantage of using MAPE over MAD.

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4. Answer briefly.

   (a) For a time series curve $U_t = 7 + 1.1(.5)^t$, what is the the ratio of first difference of U_t and U_{t-2}?
   (b) For the model $X_t = Z_t + .7X_{t-1} + .2Z_{t-1}$ find out first two π weights and two ψ weights.
   (c) What is chain relatives? where is it used?
   (d) Why exponential smoothing technique is called exponential when there is no exponential term in it?
   (e) Write two demerits of moving average method.

5×3

5. Discuss the following questions.

   (a) Construct the set of Yule Walker equations for AR(2). Also establish a recursive relation for k th order autocorrelations in terms of lower order autocorrelations.
   (b) What are the problems in growth curve estimation? Discuss any process of fitting in modified exponential curve.

5+5