B.Sc. (Honours) Examination, 2019
Semester-V (CBCS)
Statistics
Course : DSE-1
(Time Series Analysis)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin.

Answer **any four** of the following questions

1. a) What is seasonal fluctuations?
   b) Discuss ratio to moving average method in the context of deseasonalization.
   c) State any two drawbacks of moving average method. 2+5+3=10
2. a) Consider a time series curve $X_t = \frac{1}{K.ab^t}$ where 0<K<1, 0<b<1. Discuss a method of estimating the parameters.
   b) Let $\{X_t, t \in T\}$ be a series such that $X_t = \alpha X_{t-1} + a_t$ where a_t be a sequence of i.i.d. variables with mean 0 and variance 2. Is $(X_t\}$ weak stationary?
   c) For a process $\{X_t\}$, what do you mean by invertibility? 5+3+2=10
3. Write short note on **any two** of the following.
   a) Link Relative method b) Compertz curve c) Semiaverage method 10
4. a) Show that an AR(l) process can be written in terms of MA (∞) .
   b) Discuss the condition of stationarity for the model
   $X_t = \phi_1 X_{t-1} + \phi_2 X_{t-2} + a_t$.
   Where a_t being the random shocks with zero mean and variance 1. 4+6=10
5. a) For the model $X_t = Z_t + \beta_1 Z_{t-1} + \beta_2 Z_{t-2}$ where $\{Z_t\}$ being sequence of white noises. Find out all order autocorrelations. Also comment on its autocorrelation function. 3+2=5
   b) For the model $X_t = .2X_{t-1} - .7X_{t-2} + a_t$, a_t being white noise with mean zero variance 1. Construct Yule –Walker equations. Hence find first and second order partial autocorrelations. 2+3=5
6. a) Using compact lag operator method find out one-step ahead forecast for the following time series model
   $Y_t - \phi Y_{t-1} = a_t - \theta\, a_{t-1}$ where $a_t \sim \text{IID}(0,\sigma^2)$.
   b) When will you prefer to use Holt's exponential smoothing for forecast? Write down the smoothing equations for it. If seasonality is present in the data, how would you refine this method? 4+2+2+2=10

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