10. (a) What do you mean by competing risk? Describe by giving a suitable example. 5

(b) Define the terms : 3x3=9

(i) Cumulative incidence function

(ii) Sub-survivor function

(iii) Sub-hazard function.

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PG Even Semester Examination, September, 2023

STATISTICS

(4th Semester)

Course No: STSCC-402
(Applied Statistics-II)

FM: 70
Pass Marks : 28
Time: 3 Hours

The figures in the right margin indicate full marks for the question.
Answer five questions, taking one from each unit.

UNIT-I

1. (a) Define time series with example. 2

(b) Find the trend of annual sales of a trading company by moving average method

Year : 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983

Annual Sales (Rs. in thousand) : 80 84 80 80 98 92 84 88 80 100 84 96 92 104 116 112 102 114 108 126

5

(c) Write a note on classification of exponential smoothing. 7

2. (a) Give $X(t)= A_1$ coswt + A_2 sinwt; where A_1 and A_2 are independent with $E(A_i)= 0$ nd $V(A_i) = 1$; for i= 1, 2; and w is any constant. Verify the nature of the process. 5

(b) State and prove the properties of autocorrelation function. 6

(c) Explain Holt-Winter's additive model. 3

UNIT-II

3. (a) Why an autoregressive model of order 1 is weakly stationary. 7

(b) Explain the invertibility condition of a moving average process. 5

(c) State the difference between an ARMA and ARIMA model. 2

4. (a) Consider the MA(1) process $X_t= Z_t + \lambda Z_{t-1}$. Find its variance and its lag one outcovariance. 3

(b) Explain mixed autoregrssive moving average process. 4

(c) Discuss in detail Box-Jenkins' methodology. 7

UNIT-III

5. (a) Discuss the forecasting process. 7

(b) Suppose that you are in charge of capacity planning for a large electric utility. A major part of your job is ensuring that the utility has sufficient generating capacity to meet current and future customer needs. If you do not have enough capacity, you run risks of bunouts and service interruptions. If you have too much capacity, it may cost more to generate electricity.

(i) What forecast do you need to do your job effectively?

(i) Are these short range or long-range forecasts?

(iii) What data do you need to be able to generate these forecasts. 1+1+1=3

(c) Explain how to evaluate the performance of a forecasting technique for a time series. 4

6. (a) Distinguish between qualitative and quantitative forecasting techniques. 4

(b) Why forecasting is considered to be an important problem? 5

(c) What are the procedures to choose between competing modes in forecasting? 5

UNIT-IV

7. State and derive the Kaplan-Meier estimates of survival function and its variance. 6+8=14

8. Suppose $t_1, t_2, \ldots, t_n$ denotes the complete failure times, where T_i follows Exponential (θ). Find the MLE of θ, its variance and confidence interval for large n. 14

UNIT-V

9. Describe all types of designed and undesigned censoring methods by giving a suitable example. 14