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22STP420N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATIONS MAY 2025
(Fourth Semester)

Branch- **STATISTICS**

TIME SERIES AND FORECASTING

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Identify which of the following is NOT a component of a time series. a) Trend b) Seasonality c) Regression d) Irregular Component	K1	CO1
	2	___test is commonly used to check for stationarity in a time series. a) ANOVA Test b) Chi-Square Test c) Dickey-Fuller Test d) T-Test	K2	CO1
2	3	The main purpose of applying smoothing techniques in time series analysis is a) To increase the fluctuations in the data b) To highlight short-term variations c) To remove noise and identify trends more clearly d) To decrease the accuracy of forecasts	K1	CO2
	4	Mention smoothing technique considers both trend and seasonality. a) Simple Moving Average b) Single Exponential Smoothing c) Holt's Method d) Holt-Winters Method	K2	CO2
3	5	What does the Auto Correlation Function (ACF) measure in a time series? a) The correlation between two independent time series b) The correlation between a time series and its past values at different lags c) The strength of seasonality in the data d) The level of randomness in the data	K1	CO3
	6	What is the key difference between an AR and an MA model? a) AR uses past values, MA uses past errors b) AR uses past errors, MA uses past values c) AR is for trends, MA is for seasonality d) AR applies only to stationary data	K2	CO3
4	7	The indication of Random Walk model is that a) The data has no trend b) The data follows a predictable pattern c) The data depends only on past values and random shocks d) The data is always stationary	K1	CO4
	8	What is the key feature of an ARIMA model? a) It combines Auto-Regressive, Moving Average, and Differentiating techniques b) It only includes seasonal effects c) It does not use past values for prediction d) It can only be applied to stationary data	K2	CO4
5	9	Which of the following forecasting methods is NOT a qualitative technique? a) Delphi Method b) Market Research c) Time Series Analysis d) Expert Opinion	K1	CO5
	10	*If* two forecasting models have similar accuracy, which criterion should be used to select the best model? a) The model with the highest number of parameters b) The model with the lowest Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC) value c) The model with the highest mean squared error (MSE) d) The model with the most complex structure	K2	CO5

Cont...

SECTION - B

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Describe different graphical methods used to visualize time series data.	K1	CO1
		(OR)		
	11.b.	Explain Auto-covariance and Auto correlation functions in time series analysis.		
2	12.a.	What is an Smoothing Techniques? In what way it is used in Time Series? Illustrate.	K3	CO2
		(OR)		
	12.b.	With an example, explain about Moving Averages and its types. How it is applied in time series analysis?		
3	13.a.	Explain the concept of a stationary time series. Why is stationarity important in time series analysis?	K4	CO3
		(OR)		
	13.b.	Describe the concept of the Auto Correlation Function (ACF) and Partial Auto Correlation Function (PACF). How are they useful in time series modeling?		
4	14.a.	Analyze the differences between a Random Walk, a Random Walk with Drift, and a Trend Stationary Process. How does each affect the choice of a forecasting model?	K4	CO4
		(OR)		
	14.b.	Describe the steps involved in building an ARIMA model using Box-Jenkins methodology.		
5	15.a.	Critically evaluate the differences between qualitative and quantitative forecasting methods.	K5	CO5
		(OR)		
	15.b.	Define AIC, BIC, and SBC. How are these criteria used in model selection?		

SECTION -C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Define and explain the main components of a time series. How do additive and multiplicative models represent these components?	K3	CO1
2	17	Compare Holt's and Winter's exponential smoothing models. How do they improve upon simple exponential smoothing?	K3	CO2
3	18	Discuss the concept of an ARMA(p,q) model and how it combines both Auto Regressive (AR) and Moving Average (MA) components.	K3	CO3
4	19	Explain the concept of Unit Root in time series analysis and how it affects the stationarity of a process. Discuss how the Dickey-Fuller test is used to detect unit roots.	K3	CO4
5	20	Describe the steps involved in stochastic model building for time series forecasting. Assess the challenges faced in applying stochastic models to real-world data.	K3	CO5

Z-Z-Z END