PART D

Time Series
Modelling

TIME SERIES MODELLING

In Part C of this lab course, you have learnt about different types of regression models such as simple and multiple linear regressions when the predictors are quantitative as well as qualitative. We have also discussed different methods of selecting variables that truly contribute to the model.

The fourth part of this lab course comprises Sessions 15 to 17, which enable you to develop practical skills of predicting future values with the help of MS Excel 2007 using some elementary methods of time series data analysis. These projections can then be incorporated into the decision making process. For example, we can forecast production, product demand, sales revenues, inventory, etc. In time series techniques, we project the future values of a variable under consideration based on the past and present observations of that variable. In Block 4 of MSTE-002 (Industrial Statistics-II), we have explained the concept of time series that are usually combinations of four components, i.e., trend (T), cyclic (C), seasonal (S) and irregular (I).
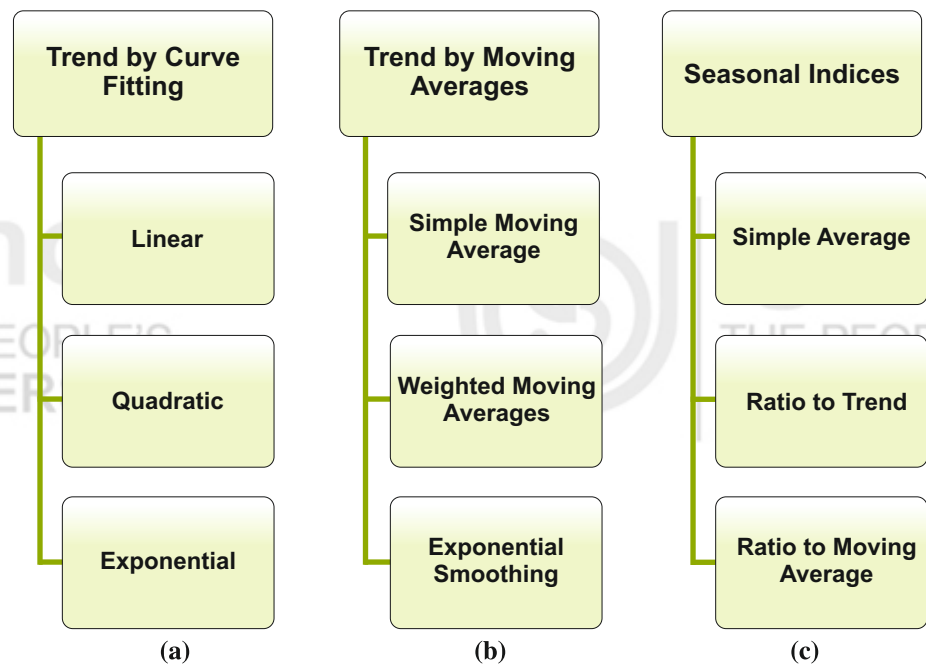

Trend by Curve Fitting	Trend by Moving Averages	Seasonal Indices
Linear	Simple Moving Average	Simple Average
Quadratic	Weighted Moving Averages	Ratio to Trend
Exponential	Exponential Smoothing	Ratio to Moving Average
(a)	(b)	(c)

Fig. D.1

In **Session 15**, we use Excel 2007 to fit different models (such as linear, quadratic and exponential) that describe time series using the method of curve fitting. We then use them for forecasting the values of the variable (under consideration) of the given time series (Fig. D.1a).

In **Session 16**, you will learn how to eliminate seasonal and irregular fluctuation from the given time series data. You will learn three methods, namely, simple moving average, weighted moving average and exponential smoothing methods (Fig. D.1.b). You will also learn how to estimate the trend by smoothing (or filtering out) the effect of seasonal and irregular fluctuations from the given time series.

Sessions 17 deals with seasonal indices. You will learn three methods of estimating them: the simple average method, ratio to trend method and ratio to moving average method (Fig. D.1c). In this session, we also

deseasonalise the data by dividing the given time series data by the corresponding seasonal indices. Then we find the trend values after eliminating the effect of seasonal variation from the deseasonalised data.

All exercises of this part have been designed in such a way that after successfully completing them, you will be acquainted with the forecasting techniques for the given time series using MS Excel 2007. You will also be able to compute trend values and seasonal indices, and learn smoothing (or filtering) the seasonal and irregular effects and deseasonalising the data.

You should study Block 4 of MSTE-002 entitled Industrial Statistics-II thoroughly before performing the activities in the lab sessions of Part D as all concepts and formulae used there will be applied here.