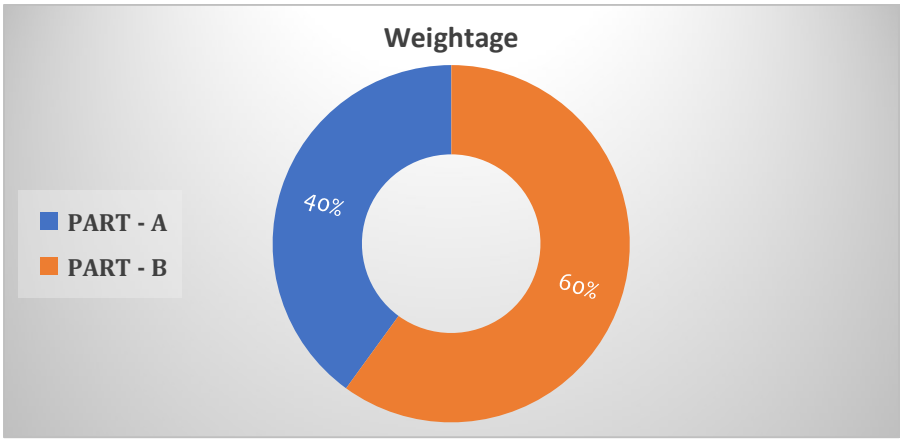
05 - BUSINESS MATHEMATICS AND STATISTICS
(Operational Level-2)

INTRODUCTION
This course comprises basic concepts and techniques of mathematics & statistics. A thorough knowledge in the areas of basic mathematics and presentation of data is an essential skill for management accountant. The management accountant should understand statistical concepts, because of the need to estimate the uncertainties of business decisions. This course also gives basic understanding of mathematical techniques applied for forecasting in corporate planning and Financial Management.

OBJECTIVES
To provide the students basic knowledge of mathematics and statistics to enable them to:
- Use and interpret mathematical and statistical methods, and
- Present the results of quantitative nature, in a suitable form for taking business decisions.

LEARNING OUTCOMES
On completion of this course, you should be able to:
- Understand integers, fractions and decimals, percentage and ratios;
- Manipulate inequalities and solve linear, non-linear and simultaneous equations;
- Understand the concept of derivatives and calculate maxima, minima and point of inflection;
- Work out simple and compound interest and understand concept of loan, mortgage and discounting;
- Calculate NPV, IRR, annuities and perpetuities;
- Realize the difference between data and information, tabulate data and prepare graphs, charts and diagrams;
- Calculate for both ungrouped and grouped data: arithmetic mean, median, mode, range, variance, standard deviation and coefficient of variation;
- Calculate dispersions, correlation, correlation coefficient and coefficient of determination;
- Compute variance, standard deviation and coefficient of variation;
- Calculate indices using either base or current weights and apply it to deflate a series;
- Calculate simple probability demonstrates conditional probability and rules of probability;
- Compute an expected value and demonstrate the use of expected value tables in decision making;
- Elucidate the concepts of risk and uncertainty;
- Demonstrate the use of normal distribution tables;
- Apply the Pareto distribution and the 80:20 rule;
- Apply the regression equation to predict the dependent variable, given a value of the independent variable;
- Prepare a time series graph and identify trends and patterns using an appropriate moving average;
- Identify the components of a time series model and prepare a trend equation using either graphical means or regression analysis;
- Calculate seasonal factors for both additive and multiplicative models and comprehend its appropriateness;
- Calculate predicted values given a time series model;
- Perform confidence Interval and hypothesis Z and T test for single population mean;
- Apply sampling Frequency Distribution with and without replacement for sample size 2 and 3;
- Find the seasonal variations and demonstrate forecasting techniques.

SYLLABUS CONTENTS



PART – A
BUSINESS MATHEMATICS

1. Basic Mathematical Techniques
- Integers, Fractions and Decimals
- Order of Operations
- Percentage and Ratios
- Roots and Powers
- Errors

2. Formulae and Equations
- Introduction
- Manipulating Inequalities
- Linear Equations, Linear Equations and Graphs, Simultaneous Equations
- Non-Linear Equations, Progressions
- Arithmetic Progression
- Geometric Progression (nth Terms and Sum)
- Matrices (Definition Sum and multiplication of two matrices)
- Use in Solving simultaneous, equators, Cramer's rules
- Linear programming, Properties and using of programming for maximization of profit and minimization of cost.

3. Derivatives
- Concept of Derivative and differentiation
- Basic Rules of differentiation
- Instantaneous rate of change
- Derivatives, Maxima and Minima & Point of Inflection

4. Compounding and Discounting
- Simple Interest, Compound Interest, Equivalent Rates of Interest
- Regular Savings and Sinking Funds
- Loan and Mortgages
- Concept of Discounting

5. Basic Investment Appraisal
- Net Present Value (NPV) Method
- Internal Rate of Return (IRR) Method
- Annuities and Perpetuities
- Linking Compounding and Discounting
- Using Spreadsheet (Define Spread sheet, need to use of spread sheet, Define work book, work sheets and type of cell contents)
- Shareholder Value (define shareholder value and identify financial objectives to maximize shareholders wealth)

PART – B
STATISTICS AND STATISTICAL INFERENCE

6. Data and Information
- Introduction, Characteristics of Good Information, Data Type (Qualitative and Quantitative data, primary and secondary data, discrete and continuous data)

7. Collection and Presentation of data
- Tables, Charts, Frequency Distribution, Histograms, Ogives, Scatter Diagram

8. Averages
- Arithmetic Mean, Harmonic mean, Geometric mean, Mode, Median

9. Dispersion
- Range
- Quartiles and Quartile Range and Quartile deviation or the Semi-Quartiles Range
- Mean Deviation
- Variance and Standard Deviation
- Coefficient of Variation
- Skewness

10.Correlation and Linear Regression
- Correlation
- Correlation Coefficient and Coefficient of determination
- Spearman's Rank Correlation Coefficient
- Lines of Best Fit
- Scatter Graph Method
- Linear Regression Analysis
- Using Spreadsheets (Characteristics of a useful spread sheets, Advantage and disadvantage of spread sheets, inserting formula in excel, explain formula with conditions)

11.Index numbers
- Basic Terminology
- Index Relatives
- Time Series of Index Relatives
- Time Series Deflation
- Composite Index Numbers
- Weighted Index Numbers
- Retail Price Index for Pakistan

12.Probability
- Concept of Probability and counting techniques (including multiplication rules of counting, combinations, permutations, etc))
- Rules of Probability
- Expected Values
- Expectation and Decision Making

13.Normal distribution
- Probability Distributions (Discrete and continuous)
- Normal Distribution
- Standard Normal Distribution
- Binominal of passion distribution
- Hyper geometric distribution
- Using Normal Distribution to Calculate Probabilities
- Pareto Distribution and 80:20 Rule

14.Estimation & Testing
- Confidence Interval Z and T test for single population mean
- Testing hypothesis Z and T test for single population mean
- Chai square distribution

15.Sampling & Sampling Frequency Distribution
- Sampling Frequency Distribution with & without replacement for sample size 2 and 3
- Random and Non-Random Sampling
- Sampling Frequency distribution for proportion

16.Forecasting - Time series

- Components of Time Series (Define time series and identify its examples, preparing time series graphs and identifying trends)
- Finding the Trend (Methods, prepare trend equation using graphical means or regression analysis)
- Finding the Seasonal Variations (Define Season variations, finding the seasonal components using additive and multiplicative models)
- Forecasting (Define forecasting, forecasting using linear regression analysis)
- Limitation of Forecasting Models
- Python for statistical analysis (introductory)