

FAR WESTERN UNIVERSITY
Faculty of Management

Course Title: **Quantitative Techniques**

Total Marks: 100

Course Code: **MGT 375**

Pass Marks: 45

Nature of course: Theory

Time per period: 1 hr.

Semester: Seventh

Total periods: 45

Level: BBA

Credit hours: 3

Course Introduction

This course is aimed at orienting students with major statistical and quantitative tools used in modeling and analysis of the real cases related to the business decision problems involving alternative choices.

General Objectives

At the end of this course the students should be able to:

- Introduce the basic concepts of statistical quality control, quantitative analysis, decision making and network models.
- Disseminates students with models for time series and forecasting.
- Provide students with a sound understanding of index numbers.
- Introduce and formulate decision making theory.
- Introduce and formulate linear programming.
- Acquaint the students with the concepts of transpiration and assignment problems.
- Familiarize the students with network models.

Specific Objectives and Contents

Unit Objectives	Contents
<ul style="list-style-type: none"> ● Describe the various components of Time Series. ● Describe the trend, cyclical, seasonal and irregular components of the time series model. ● Fit a linear or a polynomial trend equation to a time series. ● Smooth a time series with the centered moving average and exponential smoothing techniques. ● Forecast the data by various techniques. 	<p>Unit 1: Models for time series and forecasting (6)</p> <p>1.1 Introduction</p> <ul style="list-style-type: none"> ▪ Meaning and Utility of Time Series ▪ Components of Time Series <p>1.2 Time Series Decomposition Models</p> <ul style="list-style-type: none"> ▪ Additive Model ▪ Multiplicative Model <p>1.3 Forecasting Methods</p> <ul style="list-style-type: none"> ▪ Smoothing methods ▪ Exponential smoothing methods <p>1.4 Trend Projection Methods</p> <ul style="list-style-type: none"> ▪ Linear Trend Projection Method ▪ Non-linear Trend Projection Method <p>1.5 Cyclical Variation</p> <ul style="list-style-type: none"> ▪ Percent of Trend Method ▪ Relative Cyclical Residual Method

	<p>1.6 Seasonal Variation</p> <ul style="list-style-type: none"> ▪ Method of Simple Averages ▪ Ratio-to-Moving Average Method
<ul style="list-style-type: none"> • Explain the types of index number. • Describe notion and terminology of index number. • Introduce with the methods of constructing index number • Explain un-weighted and weighted method of index number. • Test of consistency of index number formulae. • Use index numbers to compare business or economic measurements from one period to the next. 	<p>Unit 2:Index Number (5)</p> <p>2.1 Definition and uses of Index Number</p> <p>2.2 Types of Index Number</p> <p>2.3 Notation and Terminology</p> <p>2.4 Method of constructing Index Number</p> <p>2.5 Un-weighted method</p> <ul style="list-style-type: none"> ▪ Simple aggregative method ▪ Simple average of price relative <p>2.6 Weighted Method</p> <ul style="list-style-type: none"> ▪ Laspeyre's index number ▪ Paasche's index number ▪ Fisher's index number <p>2.7 Cost of living index number</p> <p>2.8 Method of constructing cost if living index numbers</p> <ul style="list-style-type: none"> ▪ Aggregative expenditure method ▪ Family budget method
<ul style="list-style-type: none"> • Formulate any decision problem. • Identify decision alternatives and state of nature and pay off associated with every possible combination of decision alternatives and states of nature. • Important steps in decision making: pay off table, opportunity loss and regret table. • Decision Environment: Decision making under conditions of certainty, decision making under uncertainty. • To complete the value of EPPI & EVIP. 	<p>Unit 3:Decision Theory (5)</p> <p>3.1 Introduction</p> <p>3.2 Basic terminologies under decision theory</p> <p>3.3 Pay off and pay off table</p> <p>3.4 Steps involved in decision making</p> <p>3.5 Decision making environments</p> <p>3.6 Construction of Regret table</p> <p>3.7 Expected Profit with Perfect Information (EPPI)</p> <p>3.8 Expected Value of Perfect Information (EVPI)</p> <p>3.9 Limitation of the tabular approach for EMV Calculation</p>
<ul style="list-style-type: none"> • Introduce linear programming • Explain the system of linear inequalities • Formulate Linear Programming (LP) Model of the given theoretical problem • Identify the graphical solution of the LP Model • Familiar with the special cases in 	<p>Unit 4:Linear Programming (6)</p> <p>4.1 Introduction</p> <p>4.2 Notation and Terminology</p> <p>4.3 System of linear inequalities</p> <p>4.4 Construction of LP Models</p> <p>4.5 Graphical LP Solution</p> <p>4.6 Special cases</p> <ul style="list-style-type: none"> ▪ Infeasible solution ▪ Unbounded solution ▪ Redundancy

LP model	<ul style="list-style-type: none"> ▪ Alternative optima
<ul style="list-style-type: none"> • Formulate transportation table of the given theoretical problem • Identify the initial basic feasible solution of the transportation problem • Identify the optimum solution of transportation problem by different methods 	<p>Unit 5:Transportation Model (6)</p> <p>5.1 Introduction</p> <p>5.2 Mathematical Formulation of Transportation model</p> <p>5.3 Determination of initial solution</p> <ul style="list-style-type: none"> ▪ North-West Corner Method (NWCM) ▪ Lowest Cost- Entry Method (LCEM) ▪ Vogel's Approximation Method (VAM) <p>5.4 Degeneracy in the Transportation Problem</p> <p>5.5 Optimal Solution of Transportation Problem</p> <p>5.6 Unbounded Transportation Problem</p> <p>5.7 Maximization of Transportation Problems</p>
<ul style="list-style-type: none"> • Match the appropriate person with appropriate job • Minimize the total cost/time/effort • maximize the total profit/output/efficiency 	<p>Unit 6:Assignment Model (5)</p> <p>6.1 Introduction</p> <p>6.2 Mathematical formulation of assignment model</p> <p>6.3 Types of assignment problem</p> <ul style="list-style-type: none"> ▪ Balanced assignment problem ▪ Un-balanced assignment problem <p>6.4 Hungarian method of assignment problem</p> <p>6.5 Maximization of assignment problem</p>
<ul style="list-style-type: none"> • Plot the network diagram of the given project • Identify critical path, critical and non-critical activities • Identify slack for non-critical activities • Calculate the associated probability • Plot time chart and identify scheduling flexibility • Reduce the duration of a project by reducing time 	<p>Unit 7:Network Model (6)</p> <p>7.1 Introduction</p> <p>7.2 Basic terminologies under project network</p> <p>7.3 Network Construction (PERT/CPM)</p> <p>7.4 Network Diagram</p> <p>7.5 Probability in PERT Analysis</p>

<ul style="list-style-type: none"> • To know statistical quality control, and its use, importance and purposes. • Compute \bar{x} and R charts and their constructions, to detect lack of control in \bar{x} and r charts, their limits, uses and interpretations. • Compute p-chart and its limit, use and interpretations. • Compute c-chart and its limit, use and interpretation. • To know the acceptance quality level, consumers and producers risks. 	<p>Unit 8:Statistical Quantity Control (6)</p> <p>8.1 Introduction</p> <p>8.2 Concepts of statistical quality control, its use, importance and purposes, and control charts and control limits.</p> <p>8.3 Control chart for variables, \bar{x} and R charts, construction of \bar{x} and R charts, detecting lack of control in \bar{x} and R charts, limits, uses and interpretations.</p> <p>8.4 Control chart for attributes, p-chart, its limit, use and interpretation.</p> <p>8.5 Control chart for number of defects per unit (c-chart), its limit, use and interpretation.</p> <p>8.6 Acceptance quality level, and consumers and producers risks.</p>
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Text Books:

1. Mark L. Berenson, David M. Levine and timothy K. Krehbiel: *Basic Business Statistics* (Ninth Edition), Pearson
2. G D Eppen, F J Gould and CP Schmidt: *Introductory Management Science*, Prentice-Hall

Reference Books:

1. Levin, Richard I., David S. Rubin, Joel P. Stinson and Everest S. Gardner (Jr): *Quantitative Approaches to Management*, McGraw-Hill.
2. Siegel, Andrew F.: *Practical Business Statistics*, Irwin.
3. Taha, Hamady, A.: *Operations Research. An Introduction*, McMillan.