GUJARAT TECHNOLOGICAL UNIVERSITY

Master in Computer Application (Integrated MCA)

Year II – (Semester-III) (W.E.F. July 2014)

Subject Name: Statistical Methods (SM)

Subject Code: 4430603

1. **Learning Objectives :**
   - To develop the ability to compute descriptive statistics including diagrammatic representation and interpretation
   - To understand the concept of probability and probability distributions
   - To develop the ability to carry out testing of hypothesis on a population based on statistical measures of samples
   - To be able to carry out simple linear regression analysis
   - To understand time series analysis and its application to forecasting
   - To introduce the concept of non-parametric methods useful particularly for nominal or ordinal data

2. **Prerequisites**: None

3. **Contents :**

Unit No.	Course Content	No of Lectures
1	**Descriptive Statistics** Overview of Statistics & Applications; Data Representation: Grouping of Data, Frequency Distribution, Charts & Graphs; Central Tendency (for Ungrouped and Grouped Data): Mean, Median, Mode, Quartiles, Percentiles; Measure of Variability (for Ungrouped and Grouped Data): Range, Inter-quartile Range, Mean Absolute Deviation, Variance, and Standard Deviation, Chebyshev's Theorem; Coefficient of Variation; Measures of Shape: Skewness, Kurtosis; Measures of Association: correlation	8
2	**Probability & Probability Distributions** Introduction to Probability, Methods of Assigning Probability; Probability of Unions & Intersections of Events; Mutually Exclusive events, Independent Events, Complementary Events; Marginal, Unions joint, and Conditional Probabilities; Probability Laws, Probability Matrices; General and Special Laws of Addition and Multiplication of	10

	Probabilities; Revision of (Apriori) Probabilities: Bayes' Rule; Discrete Distributions: Binomial, Poisson, and Hyper-geometric Distributions; Continuous Distributions: Normal, and Exponential; Characteristics of all the Probability Distributions	
3	**Sampling & Sampling Distributions** Sampling: Pros & Cons of Sampling and Taking a Census, Random vs. Non-random Sampling; Random Sampling Techniques: Simple Random Sampling, Stratified Sampling, Systematic Sampling, Cluster (Area) Sampling; Non-random Sampling: Convenience Sampling, Judgment Sampling, Quota Sampling, Snowball Sampling; Central Limit Theorem; Sampling Distribution of Sample Mean (x-bar), Standard Error of Mean, Z-formula for Sample Means of a Finite and 'Infinite' Populations; Sampling Distribution of a Sample Proportion (p-cap); Estimating the Population Mean using z-Statistic (Sigma Known); Estimating the Population Mean using t-Statistic (Sigma Unknown); Estimating the Population Proportion; Estimating the Population Variance; Estimating Sample Size	**10**
4	**Testing of Hypotheses** Introduction to Hypothesis Testing: Null Hypothesis, Alternate Hypothesis, Type-I & Type-II Errors; Testing of Hypotheses about a Population Mean using the z-statistic (Sigma Known); Testing of Hypotheses about a Population Mean using the t-statistic (Sigma Unknown); Testing of Hypotheses about a Proportion; Testing of Hypotheses about a Variance; Hypotheses Testing and Confidence Intervals about the Difference in Two Means using the z-statistic (Sigma Known); Hypotheses Testing and Confidence Intervals about the Difference in Two Means: Independent Samples (Sigma Unknown); Statistical Inferences for Two Related Populations; Statistical Inferences About Two Population Proportions, p1 – p2; Testing of Hypotheses About Two Population Variances	**11**
5	**Analysis of Variance (ANOVA), Regre** Introduction to Design of Experiments; Completely Randomized Design (One-way ANOVA); Introduction to Simple Regression Analysis; Determining the Equation of the Regression Line; Residual Analysis; Standard Error of the Estimate; Coefficient of Determination	**9**

4. Text Book:

1. Ken Black, "Applied Business Statistics : Making Better Decisions", Wiley India, 7th Edition, 2012

5. Reference Books:

1. Anderson, Sweeney, Williams, “Statistics for business and economics”, 9th Ed., Thompson Pub.
2. S P Gupta, “Statistical Methods”, 30th Edition, S Chand
3. J.Susan Milton & Jesse Arnold, “Introduction to Probability & Statistics: Principles & Applications for Engineering & Computing Sciences”
4. Bharat Jhunjhunwala, “Business Statistics”, 1st Edition, S Chand, 2008
5. Richard Levin, David Rubin, “Statistics for Management”, 7th Edition, PHI
6. Nabendu Pal, Sahadeb Sarkar, “Statistics-Concepts and Applications”, 2nd Edition, PHI

6. Chapter wise Coverage from Text Book:

Unit No	Chapters
1	Chp. 1, 2, 3
2	Chp.l 4, 5, 6
3	Chp. 7, 8
4	Chp. 9, 10
5	Chp. 11 (upto 11.2), 12 (upto 12.6)

7. Suggestions for Lab Sessions : Tools to be Used - 'R' (Open Source Software available under Windows and Linux) and majority of the sums may be implemented in 'R'.

8. Accomplishments of the student after completing the course :

- Ability to apply statistical techniques in decision making in solving real-world problems.
- Ability to use computers to analyze the data.

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