CBCS Syllabus as per NEP 2020 for S.Y.B. Sc. Statistics (2023 Pattern)

Name of the Programme   : B.Com.

Programme Code   : UCOM

Class   : S.Y.B.Com.

Semester   : III

Course Type   : Minor (Theory)

Course Code   : COM-211-MN(D)

Course Title   : Applied Statistics – I

No. of Credits   : 04

No. of Teaching Hours   : 60

Course Objectives:

1. To introduce the concept of index numbers and their significance in various fields.

2. To provide an understanding of the construction methods and types of index numbers.

3. To understand concepts of correlation and regression analysis.

4. To explore the applications of correlation and regression in various fields.

5. To introduce the theory of attributes and its applications in data analysis.

6. To develop practical skills in conducting attribute analysis and interpreting results.

7. To provide practical skills in formulating and solving linear programming problems.

Course Outcomes:

By the end of the course, students should be able to:

CO1. understand problems associated with the construction of index numbers, also gain proficiency in constructing various price index numbers using methods such   as weighted Index .

CO2. comprehend the concept of Consumer Price Index (CPI) and its relevance in measuring inflation.

CO3. understand the concept of correlation and be able to measure and interpret the strength and direction of relationships between variables.

CO4. gain proficiency in performing simple and multiple regression analysis and making

predictions based on regression models.

CO5. understand the concept of attribute data and its role in statistical analysis.

CO6. understand the basic principles of linear programming and its components, including objective functions and constraints.

CO7. solve linear programming problems using graphical methods and algebraic techniques.

Topics and Learning Points

UNIT 1: Index numbers   (10L)

1.1 Concept of index number, price index number, price relatives. Problems in construction of index number.

1.2 Construction of price index number: Weighted index Number, Laspeyre's, Paasche's and Fisher's method.

1.3 Consumer price index number: Definition, methods of construction of consumer price index number - (i) family budget method (ii) aggregate expenditure method.

1.4 Shifting of base, splicing, deflating, purchasing power.

1.5 Description of the BSE sensitivity and similar index numbers

1.6 Examples and problems

UNIT 2 Correlation and Regression   (20L)

2.1 Bivariate data, Concept of correlation between two variables, positive correlation, negative correlation, no correlation. Interpretation of correlation using scatter diagram.

2.2 Karl Pearson's coefficient of correlation: computation for ungrouped data, interpretation, properties of correlation coefficient.

2.3 Spearman's rank correlation coefficient: Definition, Interpretation.

2.4 Meaning of regression, the difference between correlation and regression. Regression lines of regression. Properties of regression coefficients.

2.5 Introduction, Multiple Regression, Statement of equation of plane of regression of X_1 on X_2 and X_3.

2.6 Standard Error of Estimate, Partial and Multiple Correlation, Advantages and limitations of multiple Correlation Analysis.

2.7 Examples and problem.

UNIT 3 Theory of Attributes   (14L)

3.1 Attributes: Concept of a Likert scale, classification, notion of manifold classification, dichotomy, class-frequency, order of a class, positive class-frequency, negative class frequency, ultimate class frequency.

3.2 Relationship among different class frequencies (up to three attributes) and dot operator to find the relation between frequencies, fundamental set of class frequencies.

3.3 Consistency of data up to 2 attributes.

3.4 Concepts of independence and association of two attributes. Yule's coefficient of association (Q), $-1 \leq Q \leq 1$, interpretation.

3.5 Examples and problems (up to three attributes).

UNIT 4: Linear Programming Problems (LPP)   (16L)

4.1 Meaning and importance of Linear Programming Problem (LPP)

4.2 Statement of LPP and formulation of LPP

4.3 Definitions of solution, Feasible Solution, Basic Solution, Basic Feasible Solution, alternative solution, degenerate solution, optimal solution, unbounded solution.

4.4 Solution by Graphical method.

4.5 Canonical form and Standard form

4.6 Simplex method

4.7 Duality, relation between primal and dual problem.

4.8 Examples and problem.

References:

1. Goon A. M., Gupta M. K., Das Gupta B. (1999): Fundamentals of Statistics, Vol.II, World Press, Calcutta.

2. Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

3. Sharma K. V. S. (2001) Statistics made it simple: Do it yourself on PC. Prentce Hall of India, New Delhi.

4. Gupta S. C. and Kapoor V. K. (1987): Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.

5. B. L. Agarwal : Programmed Statistics, New Age International Publishers, New Delhi.

6. Mukhopadhyay Parimal (1999): Applied Statistics, New Central Book Agency, Pvt. Ltd. Calcutta.

7. Hill, R. C., Griffiths, W. E., & Lim, G. C. (2008). Principles of Econometrics (4th ed.). Wiley.

8. Montgomery, D. C., Peck, E. A., & Vining, G. G. (2012). Introduction to Linear Regression Analysis (5th ed.). Wiley.

9. Agresti, A. (2018). Categorical Data Analysis (3rd ed.). Wiley.

10. Taha, H. A. (2016). Operations Research: An Introduction (10th ed.). Pearson.

Cos and POs Mapping

Course Outcomes	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3														
CO2	3														
CO3			3												
CO4					3										
CO5															
CO6			3												
CO7															
CO8							3								
CO9							3								
CO10						3									

PO1: A Fundamental Knowledge and Coherent Understanding

CO1. Understand problems associated with the construction of index numbers, also gain proficiency in constructing various price index numbers using methods such as weighted index.

Weightage: 3 (Strongly related)

Justification: This CO directly aligns with PO1 as it emphasizes acquiring fundamental knowledge and understanding of constructing index numbers, which is essential for coherent understanding.

CO2. Comprehend the concept of Consumer Price Index (CPI) and its relevance in measuring inflation.

Weightage: 3 (Strongly related)

Justification: Understanding CPI and its relevance in measuring inflation contributes to fundamental knowledge and coherent understanding of economic concepts, aligning well with PO1.

PO3: Critical Thinking and Problem-Solving Skills

CO3. Understand the concept of correlation and be able to measure and interpret the strength and direction of relationships between variables.

Weightage: 3 (Strongly related)

Justification: CO3 focuses on critical thinking by requiring students to analyze relationships between variables, which directly aligns with the development of critical thinking and problem-solving skills in PO3.

CO6. Students will apply appropriate statistical tests and techniques to analyze attribute data.

Weightage: 3 (Strongly related)

Justification: Applying statistical tests and techniques to analyze attribute data necessitates critical thinking and problem-solving skills, thus aligning with the objectives of PO3.

PO5: Analytical Reasoning Skills

CO4. Gain proficiency in performing simple and multiple regression analysis and making predictions based on regression models.

Weightage: 3 (Strongly related)

Justification: Performing regression analysis and making predictions based on models require analytical reasoning skills, which are emphasized in PO5.

PO6: Innovation, Employability, and Entrepreneurial Skills

CO10. Explore applications of linear programming in production planning, transportation, and finance.

Weightage: 3 (Strongly related)

Justification: Exploring applications of linear programming encourages innovation and entrepreneurial skills by identifying opportunities for optimization and efficiency improvements in various domains, aligning with PO6.

PO7: Multidisciplinary Competence

CO8. Solve linear programming problems using graphical methods and algebraic techniques.

Weightage: 3 (Strongly related)

Justification: Understanding and applying linear programming techniques involve integration of knowledge from various disciplines such as mathematics and business, contributing to multidisciplinary competence in PO7.

CO9. Interpret the results of linear programming analysis and make optimal decisions based on the solutions.

Weightage: 3 (Strongly related)

Justification: Interpreting results and making optimal decisions based on linear programming solutions require understanding of multiple disciplines and their practical implications, aligning with the objectives of PO7.