UNIVERSITY OF PUNE

Syllabus for F.Y.B.A.

(With effect from Academic Year 2008-2009)

(40) Statistical Pre-Requisites

The course in 'Statistical Pre-requisites' may be offered only by candidates,offering one of the Social Sciences as their Special subject at the B.A. Degree Examination.

The Course in 'Statistical Pre-requisites' cannot be offered by those who offered any of the Courses in Statistics Groups for their B. A. Examination.

Note : (1) Mathematical derivations and proofs are not expected.

(2) Student should be introduced to MSEXCEL/Spreadsheet.

Objective : The main objective of this course is to acquaint students with some basic concepts in statistics. They will be introdeuced to some elementary statistical methods of analysis of data.

At the end of this course students are expected to be able

(i) to compute various measures of central tendency, dispersion, skewness and kurtosis.

(ii) to compute the correlation coefficient for ungrouped bivariate data and interpret it.

(iii) to analyze data pertaining to attributes and to interpret results.

(iv) to analyze data pertaining to Index Numbers and to interpret the results.

(40) Statistical Pre-Requisites

1. Population and Sample **(8)**

1.1 Types of characteristics :

Attributes : Nominal scale, ordinal scale, Variables : Interval scale, ratio scale, difference between linear scale and circular scale, discrete and continuous variables, raw data.

1.2 Types of data : (a) Primary data, Secondary data.

(b) Cross-sectional data, time series data, failure data, industrial data, directional data.

1.3 Notion of a statistical population : Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample.

1.4 Methods of sampling (description only) : Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling.

2. Presentation of Data **(12)**

2.1 Classification : Discrete frequency distribution, inclusive and exclusive methods of classification, open end classes, cumulative frequency distribution and relative frequency distribution.

2.2 Graphical Presentation of Data : Histogram, frequency curve, ogive curves, stem and leaf chart.

2.3 Simple Numerical Problems.

3. Measures of Central Tendency (16)

3.1 Concept of central tendency of statistical data : Statistical average, characteristics of a good statistical average.

3.2 Arithmetic Mean (A.M.) Definition, effect of change of origin and scale, combined mean of two groups, merits and demerits

3.3 Mode : Definition, formula for computation, graphical method of determination of mode, merits and demerits.

3.4 Median : Definition, formula for computation, graphical method of determination of median, merits and demerits.

3.5 Partition Values : Quartiles, Deciles and Percentiles, graphical method of determination of quartiles, deciles and percentiles for grouped frequency distributions.

Means of Transform Data

3.6 Geometric Mean (G.M.) : Definition, merits and demerits, means of transformed data

3.7 Harmonic Mean (H. M.) : Definition, merits and demerits

3.8 Weighted arithmetic mean.

3.9 Simple Numerical Problems

3.10 Situations where one kind of average is preferable to others.

4. Measures of Dispersion **(14)**

4.1 Concept of dispersion, characteristics of good measure of dispersion.

4.2 Range : Definition, merits and demerits.

4.3 Semi-interquartile range (Quartile deviation), Merits and demerits.

4.4 Mean deviation : Definition, merits and demerits.

4.5 Mean square deviation : Variance and standard deviation (S.D.) : merits and demerits.

4.6 Measures of dispersion for comparison of two distribution, coefficient of variation (C.V.)

4.7 Simple Numerical Problems.

5. Moments (6)

5.1 Raw moments (m'_r) for grouped and ungrouped data upto order four.

5.2 Central moments (m_r) for ungrouped and grouped data upto order four, Effects of change of origin and scale.

5.3 Relations between central moments and raw moments upto order four.

5.4 Simple Numerical Problems

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6. Skewness and Kurtosis (12)

6.1 Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution.

6.2 Bowley's coefficient of skewness : interpretation using Box plot.

6.3 Karl Pearson's coefficient of skewness.

6.4 Measures of skewness based on moments.

6.5 Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions.

6.6 Obtaining measures of kurtosis based on moments.

6.7 Simple Numerical Problems.

7. Correlation (14)

7.1 Bivariate data.

7.2 Concepts of correlation between two variables, positive correlation, negative correlation, zero correlation.

7.3 Scatter diagram, conclusion about the type of correlation from scatter diagram.

7.4 Karl Pearson's coefficient of correlation (r) : Definition, computation for ungrouped data and interpretation.
Properties : (i) $-1 \leq r \leq +1$, (ii) Effect of change of origin and scale.

7.5 Spearman's rank correlation coefficient : Definition, computation and interpretation (without ties).

7.6 Simple Numerical Problems.

8. Regression (14)

8.1 Concept of regression, linear of regression, interpretation of slope and intercept.

8.2 Regression coefficient (b_{yx}, b_{xy}) : Definition, computation, statement of properties
(1) $b_{yx} \cdot b_{xy} = r^2$, (2) $b_{yx} \cdot b_{xy} \leq 1$, (3) Effect of change of origin and scale.

8.3 Simple Numerical Problems.

9. Theory of Attributes **(8)**

9.1 Attributes : Classification, notion of dichotomy and manifold classification, class-frequency, order of class, positive class-frequency, negative class frequency, quantra class, ultimate class frequency, relationship among different class frequencies of different order (up to three attributes), dot operator, fundamental set of class frequencies.

9.2 Consistency of data upto three attributes.

9.3 Concepts of independence and association of two attributes.

9.4 Yule's coefficient of association (Q).

10.5 Simple Numerical Problems.

10. Index Numbers **(8)**

10.1 Meaning of Index Numbers

10.2 Problems in constructions of index numebrs

10.3 Price Index numbers .

10.4 Methods of construction of index numbers (simple and weighted) Laspeyre's Paasche's and Fisher's index numbers

10.5 Simple Numerical Problems.

Reference Books

1. Goon Gupta and Das Gupta : Fundamentals of Statistics, Vol. I, Ed. 5, The World Press Pvt. Ltd., Kolkata, 1986.
2. Gupta, S. P. Statistical Methods, Ed. 12, Sultan Chand and Sons, New Delhi.
3. Gupta, S. C. Fundamental of Statistics by Himalaya Publishing House.
4. Nabendu Pal and Sahadeb Sarkar : Statistics Concepts and Applications, Eastern conomy Edition, Prentice-Hall of India Pvt. Ltd., New delhi.
5. Walpole R. F. : Introduction to Statistics, Macmilan Co. New York.
5. Gupta, S. C. and Kapoor, V. K. : Fundamentals of Mathematical Statistics, Ed. 3, Sultan Chand and Sons, New Delhi, (1987) .
6. Goon Gupta and Das Gupta : Fundamentals of Statistics, Vol. II, Ed. 6, The World Press Pvt. Ltd., Kolkata, 1986.
7. R. I. Levin and D. S. Rubin : Statistics for Management, Prentice Hall of India Pvt. Ltd., New Delhi.