Teaching Plan

Month	Period	Topic / sub- topic to be taught F.Y.B.Sc Semester-I Paper-I
August	2	**Unit 1. Introduction to Statistics** **1.1** Meaning of Statistics as a Science. **1.2** Importance of Statistics. **1.3** Scope of Statistics: In the field of Industry, Biological sciences, Medical sciences, Economics, Social Sciences, Management sciences, Agriculture, Insurance, Information technology, Education and Psychology. **1.4** Statistical organizations in India and their functions: CSO, ISI, NSSO,IIPS (Devnar, Mumbai), Bureau of Economics and statistics. **1.5** Statistical Heritage (Indian Perspective: i)Dr. V. S. Huzurbazar, Dr. P.C. Mahalnobis, Dr. P. V. Sukhatme, Dr. C. R. Rao).
September	4	**Unit 2. Population and Sample** **2.1**Types ofcharacteristics: Attributes: Nominal scale, ordinal scale, Variables: Interval scale, ratio scale, discrete and continuous variables, difference between linear scale and circular scale **2.2** Types of data: (a) Primary data, Secondarydata (b) Cross-sectional data, time series data, directionaldata. **2.3** Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of a sample and a random sample Methods of sampling (Description only): Simple random sampling with and without replacement (SRSWR and SRSWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.

October	14	**Unit 3. Summary Statistics:** **3.1** Review/Revision of Presentation of Data. Interpretation of Data from table and graph. Data validation **3.2** Frequency Classification: Raw data and its classification, ungrouped frequency distribution,Sturges' rule, grouped frequency distribution, cumulative frequency distribution,inclusive and exclusive methods of classification, Open end classes, and relative frequency distribution. **3.3 Measures of CentralTendency:** Concept of central tendency of statistical data, Statistical averages, characteristics of a good statistical average. Arithmetic Mean (A.M.): Definition, effect of change of origin and scale, combined mean of a number of groups, merits and demerits, trimmed arithmeticmean. Mode and Median: Definition, formulae (for ungrouped and grouped data), merits and demerits. Empirical relation between mean, median and mode. Partition Values: Quartiles, Deciles and Percentiles (for ungrouped and grouped data), Box Plot. Geometric Mean (G.M.): Definition, formula, merits and demerits. Harmonic Mean (H.M.): Definition. Formula, merits and demerits. Order relation between arithmetic mean, geometric mean, harmonic mean Weighted Mean: weighted A.M., G.M. and H.M. Situations where one kind of average is preferable to others. **3.4 Measures of Dispersion**: Concept of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range (Quartile deviation): Definition, merits and demerits, Mean deviation: Definition, merits and demerits, minimality property (without proof), Variance and standard deviation: Definition, merits and demerits, effect of change of origin and scale, combined variance for n groups (derivation for twogroups). Mean squared deviation: Definition, minimality property of mean squared deviation (with proof), Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation(C.V.)
November	8	**4. Moments, Skewness and Kurtosis:** **4.1** Raw moments (m'_r) for ungrouped and groupeddata. Central moments (m_r) for ungrouped and grouped data, Effect of change of origin and scale.Relations between central moments and raw moments, upto 4-th order (without proof). **4.2** Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequencydistribution. Bowley's coefficient of skewness:Bowley's coefficient of skewness lies between −1 to 1 (with proof), interpretation using Box plot. Karl Pearson's coefficient of skewness. Measures of skewness based on moments(β_1, γ_1). **4.3**Concepts of kurtosis, leptokurtic,mesokurti and platykurtic frequency distributions.Measures of kurtosis based on moments (β_2, γ_2).

December	8	**5 Theory of Attributes:** **5.1** 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, relationship among different class frequencies (up to three attributes), and dot operator to find the relation between frequencies, fundamental set of class frequencies. **5.2** Consistency of data up to 2 attributes. **5.3** Concepts of independence and association of two attributes. Yule's coefficient of association (Q), $-1 \leq Q \leq 1$,interpretation.

Month	**Period**	**Topic / sub- topic to be taught** **F.Y.B.Sc Semester-II Paper-I**
	10	**1 Correlation:** **1.1** Bivariate data, Scatter diagram and interpretation. Concept of correlation between two variables, positive correlation, negative correlation, no correlation. Covariance between two variables (m_{11}): Definition, computation, effect of change of origin and scale. **1.2** Karl Pearson's coefficient of correlation (r): Definition, computation for ungrouped data and interpretation. Properties: (i) $-1 \leq r \leq 1$(with proof), (ii) Effect of change of origin and scale (with proof). **1.3** Spearman's rank correlation coefficient: Definition, derivation of formula, computation and interpretation (without ties). In case of ties, compute Karl Pearson's correlation coefficient between ranks. (Spearman's rank correlation coefficient formula with correction for ties not expected.)
March	8	2**Fitting of Line (Regression Line):** **2.1 Concept of dependent and independent variables.** **2.2 Identification of response and predictor variables and relation between them.** **2.3** Meaning of regression, difference between correlation andregression, Connection between correlation and regression. Fitting of line Y= a + bX. a and b are estimated using least square.Regression coefficient. Explained and unexplained variation, coefficient of determination, standard error of an estimate of line of regression. Interchanging the role of X and Y we can study some more properties.

April	10	3. **Curve Fitting:** **3.1 Necessity and importance of drawing second degree curve.** **3.2 Fitting of second degree curve (Y = a + b X + cX2),** **3.3** Fitting of exponential curves of the type $Y = a\,b^x$ and $Y = aX^b$. In all these curves constants a, b, c are found out by the method of least squares. (Justification via determinant of matrix of second derivative/second derivative test).
May	8	4. **Index Numbers:** **4.1 Introduction and scope of Index Numbers. Various types of Index Numbers like Human** Development Index, Happiness Index BSE sensitivity Index. **4.2 Definition and Meaning.** **4.3 Problems/considerations in the construction of index numbers.** **4.4** Simple and weighted price index numbers based on price relatives. **4.5 Simple and weighted price index numbers based on aggregates.** **4.6 Laspeyre's, Paasche's and Fisher's Index numbers.** **4.7** Consumer price index number: Considerations in its construction. Methods of construction of consumer price index number - (i) family budgetmethod (ii) aggregate expenditure method 4.8 Shifting of base, splicing, deflating, purchasingpower.

Month	Period	Topic / sub- topic to be taught F.Y.B.Sc Semester-II Paper-II
Feburary	16	**1. Some Standard Discrete Probability Distributions**: 1.1Poisson distribution: p.m.f. of the distribution Notation: X ~P(m). m.g.f. and c.g.f. Moments, mean, variance, skewness and kurtosis. Situations where this distribution is applicable. Additive property for Poisson distribution. Conditional distribution of X given (X+Y) for Poisson distribution. 1.2Geometric distribution: Notation: X ~G(p), Geometric distribution on support (0, 1, 2, ...,) with p.m.f. $p(x) = pq^x$. Geometric distribution on support (1, 2, ...) with p.m.f. $p(x) = pq^{x-1}$. $0 < p < 1$, $q = 1 - p$. Mean, variance, m.g.f. and c.g.f. Situations where this distribution is applicable. Lack of memory property.
March	6	**2. Bivariate DiscreteProbabilityDistribution:** **2.1** Definition of two-dimensional discrete random variable, its joint p.m.f. and its distribution function and their properties. **2.2 Concept of identically distributedr.vs.** 2.3 Computation of probabilities of events in bivariate probability distribution. **2.4 Concepts of marginal and conditional probabilitydistributions.** **2.5 Independence of two discrete random variables based on joint and marginal p.m.f.s**
April	14	**3 Mathematical Expectation (Bivariate Random Variable)** **3.2 Definition of raw and central moments, m.g.f,c.g.f.** **3.3 Theorems on expectations of sum and product of two jointly distributed random variables.** **3.4 Conditionalexpectation.** **3.5** Definitions of conditional mean and conditionalvariance. **3.6** Definition of covariance, coefficient of correlation, independence anduncorrelatedness of twovariables. **3.7 Variance of linear combination of variables Var(aX +bY).**