LESSON PLAN
STATISTICS (General), EVEN SEMESTER
Semester- VI (CBCS)

SEC-B2 SEM - 6 MONTE CARLO METHOD (STS-G-SEC-B-6-4-TH) **2 Credits**		**Internal Assessment :20 marks Semester-end Exam(Theory): 80marks** **Total : 100 marks**	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	I. Using the computer for random number generation. (treated as a black box). II. A brief look at some popular approaches (non-mathematical justification needed). III. Simulating a coin toss, a die roll and a card shuffle.	SKG	**4** weeks
2.	I. CDF inversion method. Simulation from standard distributions. II. Finding probabilities and moments using simulation	SKG	**3** weeks
3.	I. Monte Carlo integration. Basic idea of importance sampling.	SKG	**3** weeks
4	I. Generating from Binomial, and comparing the histograms to the PMFs. II. Generating from Uniform(0,1) distribution, And applying inverse CDF transforms. III. Simulating Gaussian distribution using Box-Muller method. ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.** IV.	SKG	**4** weeks
DSE-B6- PROJECT WORK (Analysing Social Change in Historical Perspective) 6 credits **STC-G-SEC-B-6-4-TH**		**Total :100 marks**	
	Objective: The aim of the course is to initiate students to write and present a statistical report, under the supervision of a faculty, on some area of human interest. The project work will provide hands on training to the students to deal with data emanating from some real life situation and propel them to dwell on some theory or relate it to some theoretical concepts.	SKG	**4 Classes / wk**

Semester- IV(CBCS)

CC-4 SEM-4 Applications of Statistics (STS – G - CC – 4 – 4 TH) & (STS – A – GE – 4 – 4 - TH) 4 Credits **Applications of Statistics Lab (STS – G - CC – 4 – 4 P) & (STS – A – GE – 4 – 4 – P) 2 Credits**		**Internal Assessment :20 marks** **Semester-end Exam(Theory): 50 marks** **Semester-end Exam(Prac): 30 marks** **Total : 100 marks**	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	I. Concept of population and sample, complete enumeration versus sampling, sampling and non-sampling errors. Types of sampling: non-probability and probability sampling, basic principle of sample survey. II. Simple random sampling with and without replacement, definition and procedure of selecting a sample, estimates of: population mean, total and proportion, variances of these estimates, estimates of their variances. III. Stratified random sampling: Technique, estimates of population mean and total, variances of these estimates, estimates of their variances, proportional and optimum allocations.	SKG	**5 WEEKS** (including practical)
2.	I. Index numbers: Definition, Criteria for a good index number, different types of index numbers. Construction of index numbers of prices and quantities, consumer price index number & wholesale price index number. Uses and limitations of index numbers. Tests for index numbers. II. Economic Time Series: Components of time series, Decomposition of time series- Additive and multiplicative model with their merits and demerits, Illustrations of time series. Measurement of trend by method of free-hand curve, method of least squares. Moving average method.	SKG	**5 WEEKS** (including practical)

Semester- II (CBCS)

CC-2 SEM-2 Elementary Probability Theory (STS – G - CC – 2 – 2-TH) & (STS – A – GE –2 – 2 -TH) 4 Credits **Elementary Probability Theory Lab (STS – G - CC – 2 – 2P) & (STS – A – GE –2 – 2 - P) 2 Credits**		**Internal Assessment:20 marks** **Semester-end Exam(Th): 50 marks** **Semester-end Exam(Prac): 30 marks** **Total : 100 marks**	
UNIT	**TOPICS**	**TEACHER**	**TIME**
1.	Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.	SKG	**5 WEEKS** (including practical)
2.	Random Variables: Discrete and continuous random variables, p.m.f., p.d.f., c.d.f. Illustrations of random variables and its properties. Expectation, variance, moments.	SKG	**4 WEEKS** (including practical)
3.	Standard probability distributions: Binomial, Poisson, geometric, negative binomial, Uniform, normal, exponential. Weak law of large numbers and Lindeberg-Levy Central Limit Theorem (C.L.T). ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.**	SKG	**5 WEEKS** (including practical)

LESSON PLAN
STATISTICS (General), ODD SEMESTER
Semester- I (CBCS)

CC-1 SEM-1 Descriptive Statistics (STS – G - CC – 1 – 1- TH) & (STS – A – GE – 1 – 1 - TH) 4 Credits **Descriptive Statistics Lab (STS – G - CC – 1 – 1- TH) & (STS – A – GE – 1 – 1 - TH) 2 Credits**		**Internal Assessment :20 marks** **Semester-end Exam(Theory): 50 marks** **Semester-end Exam(Prac): 30 marks** **Total : 100 marks**	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	Introduction: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Frequency distribution,Presentation: tabular and graphic, including histogram and ogives.	SKG	**4 WEEKS** (including practical)
2.	Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.	SKG	**5 WEEKS** (including practical)
3.	Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation (Spearman). Simple linear regression, principle of least squares and fitting of polynomials and exponential curves. ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.**	SKG	**5 WEEKS** (including practical)

Semester-III (CBCS)

CC-3 SEM -3 Introduction to Statistical Inference (STS – G - CC – 3 – 3- TH) & (STS – A – GE – 3 – 3 - TH) 4 Credits Introduction to Statistical Inference Lab (STS – G - CC – 1 – 1- P) & (STS – A – GE – 1 – 1 - P) 2 Credits		**Internal Assessment :20 marks Semester-end Exam(Theory): 50 marks Semester-end Exam(Prac): 30 marks Total : 100 marks**	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	Population and Sample, Parameter and Statistic, Population distribution and Sampling distribution. Statistical Inference: Point Estimation, Interval Estimation and Testing of Statistical Hypothesis. Four useful distributions for statistical Inference; Normal, $\chi 2$, t and F (Statement of the pdf's & shape of the curves)	SKG	**4 WEEKS** (including practical)
2.	Estimation of population mean, confidence intervals for the parameters of a normal distribution (one sample and two sample problems). The basic idea of significance test. Null and alternative hypothesis. Type-I & Type II errors, level of significance, concept of p-value. Tests of proportions. Tests of hypotheses for the parameters of a normal distribution (one sample and two sample problems). Sign test (Single Sample)	SKG	**5 WEEKS** (including practical)
3.	Analysis of variance, one-way and two-way classification (one & multiple observation(s) per cell). Brief exposure of three basic principles of design of experiments, Statistical concepts of "treatment", "plot" and "block". Analysis of completely randomized design, randomized complete block design. ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.**	SKG	**5 WEEKS** (including practical)

Semester-V (CBCS)

DSE- A SEM - 5 Operations Research (STS – G - DSE – A- 5– 1 - TH) 4 Credits **Operations Research (STS – G - DSE – A- 5– 1 – P) 2 Credits**		**Internal Assessment :20 marks** **Semester-end Exam(Theory): 50 marks Semester-end Exam(Prac): 30 marks** **Total : 100 marks**	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	Introduction and Historical Background, Phases of Operations Research, model building, various types of O.R. problems. Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical Methods to Solve Linear Programming Problems.	SK G	**4 WEEKS** (including practical)
2.	Simplex method for solving L.P.P. Charne's M-technique for solving L.P.P. involving artificial variables. Special cases of L.P.P. Concept of Duality in L.P.P: Dual simplex method.	SK G	**5 WEEKS** (including practical)
3.	Introduction, Formulation of Transportation Problem (TP). Initial solution by North West corner rule, Least cost method and Vogel's approximation method (VAM), MODI's method to find the optimal solution, special cases of transportation problem. Assignment problem: Hungarian method to find optimal assignment, special cases of assignment problem. ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.**	SK G	**5 WEEKS** (including practical)

SEC-A2 SEM- 5 RESEARCH METHODOLOGY (STS-G-SEC- A-5 - 3-TH) 4 Credits		Internal Assessment :20 marks Semester-end Exam(Theory): 80marks Total : 100 marks	
UNIT	**TOPIC**	**TEACHER**	**TIME**
1.	What is Research? Role of Research in important areas. Characteristics of Scientific Method. Process of research: Stating Hypothesis or Research question, Concepts & Constructs, Units of analysis & characteristics of interest, Independent and Dependent variables, Extraneous or Confounding variables. Measurements and scales of Measurements. Types of research: Qualitative & Quantitative Research, Longitudinal Research, Survey & Experimental Research.	SKG	**7 WEEKS**
2.	Survey Methodology and Data Collection, sampling frames and coverage error, non-response. ****Continuous internal evaluations are usually taken at the completion of each Unit included in the syllabus.**	SKG	**7 WEEKS**