Semester	**Six**
Course	**Major**
Paper Code	
Paper Title	**Survey Sampling-I & Design of Experiments -I**
No. of Credits	**4**
Theory/Composite/ Practical	**Theory**
Minimum No. of preparatory hours per week a student has to devote	**Module 1: 2 classes per week** **Module 2: 2 classes per week**
Number of Modules	**2**
Syllabus	**Module 1: Survey Sampling -I** **UNIT1:** *Introductory Concepts:* Population and sample, complete enumeration versus sampling, sampling frame, target population and population sampled. Basic principles of sample survey. Types of sampling: non-probability and probability sampling, sampling design and sampling scheme. Inclusion probabilities. Requirement of a good estimator . Sampling and non-sampling errors. [6L] **UNIT 2:** *Simple random sampling (SRS) 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 and sample size determination. [12L] **UNIT 3:** *Stratified random sampling:* Technique, estimates of population mean and total, variances of these estimates. Principle of stratification. Proportional and optimum allocations and their comparison with SRS. Practical difficulties in allocation. [8L] **Module II: Design of Experiments – I** **UNIT 1:** *Experimental designs:* Introduction and historical perspective. Experimental error. Basic principles of design. Uniformity trials, fertility contour maps, choice of size and shape of plots and blocks. [3L] **UNIT 2:** *Basic designs:* Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) – Layout, model and analysis. Relative efficiencies. Analysis with one missing observation in RBD and LSD. [15L] **UNIT 3:** *Factorial experiments & Confounding:* Advantage of factorial experiment over single factor experiments. Concept of 2^n factorial experiments, related design and analysis. Total and Partial confounding for 2^n factorial experiments. [8L]
Learning Outcomes	1. Understand the concepts of population, sample, and different sampling methods, distinguishing between sampling and non-sampling errors. 2. Apply appropriate sampling techniques and compute estimates, variances of the estimates and sample sizes for different methods. 3. Analyze and compare the efficiency of SRS and stratified sampling techniques. 4. Explain the role and historical development of experimental designs.

	5. Justify the choice of appropriate plot and block sizes in agricultural or industrial experiments. 6. Apply the principles of basic designs including layout, model, analysis and relative efficiencies. 7. Analyse the impact of missing observations in RBD and LSD. 8. Analyse 2^n factorial experiments and confounded designs. 9. Create layout confounded designs.
Reading/Reference List	1. Cochran, W.G. (1984): Sampling Techniques (3rd Ed.), Wiley Eastern. 2. Sukhatme, P.V., Sukhatme, B.V. Sukhatme, S. Asok, C. (1984). Sampling Theories of Survey with Application, IOWA State University Press and Indian Society of Agricultural Statistics. 3. Murthy, M.N. (1977): Sampling Theory & Statistical Methods, Statistical Pub. Society, Calcutta. 4. Des Raj and Chandhok P. (1998): Sample Survey Theory, Narosa Publishing House. 5. Goon A.M., Gupta M.K. and Dasgupta B. (2008): Fundamentals of Statistics, Vol-II, World Press. 6. Introduction to Sampling Theory Swayam Prabha Course. 7. Mukhopadhyay, P. (2005): Applied Statistics. 2nd edition, Books and Allied Pvt Ltd. 8. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asia Publishing House. 9. Dey, A. (1986) : Theory of Block Designs, Wiley Eastern Limited. 10. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley. 11. Das, M.N. and Giri, N. C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.
Evaluation	CIA: 30 End-Sem: 70 Total: 100

Paper Structure for Semester Exam	Module-I (35 marks)	Module-II (35 marks)
	Short questions (5 marks): 4 out of 6 Long questions (15 marks):1 out of 2	Short questions (5 marks): 4 out of 6 Long questions (15 marks): 1 out of 2