Programme/Class: **Diploma**	Year: **Second**	Semester: **Fourth**
Subject: **STATISTICS(Theory, Paper-I)**		
Course Code:-	Course Title: **Sampling Techniques & Analysis of Variance (ANOVA)**	

Course outcomes:

After completing this course a student will have:
- ✓ Ability to understand the concept of sampling and how it is different from complete enumeration.
- ✓ Knowledge of various probability and non- probability sampling methods along with estimates of population parameters
- ✓ Ability to identify the situations where the various sampling techniques shall be used.
- ✓ Knowledge of sampling and non-sampling errors.

- ✓ Knowledge of the concept of Analysis of Variance (ANOVA).
- ✓ Ability to carry out the ANOVA for One way and two way Classification.
- ✓ Ability to carry out the post-hoc analysis.

Credits:**04**	Core: **Compulsory**
Max.Marks:**75+25**	Min. Passing Marks: **………**
Total No. of Lectures-Tutorials-Practical (in hours per week):**4-0-0**.	

Unit	Topic	No. of Lectures
PAPER I : Sampling Techniques & Analysis of Variance (ANOVA)		
PART A: SAMPLING Techniques		
I	Introduction, Type of Sampling- Purposive sampling, Probability sampling, Parameter and Statistic- Sampling Distribution of Statistic, Standard Error, Sampling vs. complete enumeration, sampling units and frame, sampling and non-sampling errors, precision and efficiency of sampling estimators.	**08**
II	Simple random sampling with and without replacement, definition and procedure of selecting a sample, Estimates of: population mean, total and proportion, variance of these estimates, estimates of their variances and sample size determination. Simple Random Sampling of Attributes	**12**
III	Stratified random sampling: Technique, estimates of population mean and total, variances of these estimates, proportional and optimum, Neyman allocations and their comparison with SRS. Practical	**10**

	difficulties in allocation, estimation of gain in precision, post stratification and its performance.	
IV	Systematic sampling: Technique, estimates of population mean and total, variances of these estimates (N=nk). Comparison of systemic sampling with SRS and stratified sampling in the presence of linear trend.	10
V	Introduction to Ratio and regression methods of estimation, first approximation to the population mean and total (for SRS of large size), variance of these estimates and estimates of these variances, variances in terms of correlation coefficient for regression method of estimation and their comparison with SRS.	**10**

PART B: ANALYSIS OF VARIANCE		
VI	Introduction to Analysis of Variance (ANOVA) and Definition, Causes of Variation Classification of ANOVA, one way classification with one observation per cell, One way classification with 'm' observations per cell, Two way classification with one observation per cell: Mathematical model, Sum of squares for various causes of variation, Expected value of Sum of Squares, Degrees of freedom for Sum of Squares, ANOVA Table and related tests of Significance.	**10**

Suggested readings:

1. Design and Analysis of Experiments: M. N. Das and N. C. Giri.
2. Fundamentals of Statistics. Vol.II: A.M. Goon, M.K. Gupta and B. Dasgupta.
3. Applied Statistics: P. Mukhopadhyay.
4. Fundamental of Applied Statistics: S.C. Gupta and V. K. Kapoor
5. Sampling Techniques: W. G. Cochram
6. Sampling   Theory: Des Raj and Chandok
7. Sample Theory of Surveys with Applications: V. G. Panse and P. V. Sukhatme.
8. Sampling Techniques: Daroga Singh and F. S. Chaudhary
9. Survey Sampling: P. Mukhopadhyay

Suggested Online Links/Readings:
- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics

- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Suggested Continuous Evaluation Methods:

Continuous Internal Evaluation shall be based on allotted Assignment and Class Tests. The marks shall be as follows:

Quiz/Assignment	(05marks)
Class Test-I	(10marks)
Class Test-II	(10marks)

Course prerequisites: To study this course, a student must have passed Sem-III Theory Paper-I

Programme/Class: **Diploma**	Year: **Second**	Semester: **Fourth**

Subject: **STATISTICS(Practical, Paper- II)**

Course Code:-	Course Title: **Sampling Techniques and Analysis of Variance Lab**

Course outcomes:
After completing this course a student will have:

2. Ability to perform ANOVA for one way and two classifications.
3. Ability to perform post-hoc analysis.
4. Ability to draw a simple random sample with the help of table of random numbers.
5. Ability to estimate population means and variance in simple random sampling.
6. Ability to deal with problems based on Stratified random sampling for population mean (proportional and optimum allocation).
7. Ability to deal with problems based on Systematic random sampling.

Credits:**02**	Core: **Compulsory**
Max.Marks:50	Min. Passing Marks: **………**
Total No. of Lectures-Tutorials-Practical (in hours per week):**0-0-4**.	

	Topic	No. of Lectures

1. Problems based on drawing a simple random sample with the help of table of random numbers. 2. Problems based on estimation of population means and variance in simple random sampling. 3. Problems based on Stratified random sampling for population means (proportional and optimum allocation). 4. Problems based on Systematic random sampling 5. Problems based on Analysis of variance in one-way and two-way classification.	**60**

Suggested Readings:

As suggested for paper I & II

Suggested Continuous Evaluation Methods(10 marks):

Continuous Internal Evaluation shall be based on Practical File/Record, Class Activities and Overall performance .The marks shall be as follows:

Practical File/Record	**(05 marks)**
Class Interaction	**(03 marks)**
Report Preparation/Presentation	**(02marks)**

Suggested Practical Examination Evaluation Methods:(40Marks)

Practical Examination Evaluation shall be based on Viva-voce and Practical Exercises. The marks shall be as follows:

Practical Exercise(Major) 01x15Marks	**15 Marks**
Practical Exercise(Minor) 01x10Marks	**10 Marks**
Viva-voce	**15 Marks**

There shall be04-05 Practical Exercises in Examination comprising 01 as Major (Compulsory) and 03-04 as Minor (Students have to attend any 01).

Course prerequisites: To study this course, a student must have opted Sem-IV Theory Paper-I
Further Suggestions:
 In practical classes a series of lectures for any statistical software may be organized for students and they may be asked to use it to perform practical problems assigned to them.