## Syllabus for M.Phil (Statistics) Course, 2014-15

### Scheme of Examination

| S.No. | Title of the Paper | Max.Mark |
|-------|--------------------|----------|
| 1. | Paper – I(Compulsory):  Research Methodology ,Quantitative Methods  &  Computer application | 100 |
| 2. | Paper – II   (Optional) : Advanced Operations Research | 100 |
| 3. | Lab Course    : Based on Theory Papers I & II | 100 |
| 4. | Dissertation | 200 |
| 5. | Seminar  & Viva-voce on Dissertation | 100 |
| | **Total Marks** | **600** |

### Paper-I (Compulsory)

### Research Methodology ,Quantitative Methods  & Computer applications

**Unit I** : Research methodology: An introduction ,meaning of research ,objective of research, Research Methods versus Methodology, Selection of research problem, Necessity of defining the problem. Technique involved in Defining a problem.

Methods of Data Collection: Collection of Primary data, construction of questionnaire, Collection of data through questionnaire, Difference between questionnaires and schedules ,Some other methods of data collections, Collection of Secondary data, Processing and analysis of data. Use of Statistical packages, SPSS for data analysis.

**Unit II**:  A review of Simple Random Sampling, Estimation of population proportion, Stratified sampling, Optimum Allocation, Practical difficulty in adopting Neyman Allocation, formation of strata. Systematic sampling.

**Unit III:** PPS sampling , Desraj  Estimator,  Horwitz-Thompson estimator and its variance estimation, Yates-Grundy form, Midzuno sampling scheme, Rao- Hartley- Cochran's Procedure. Multistage sampling.

**Unit IV:** Ratio and Regression methods of estimation in various sampling designs. OIkin's multivariate ratio estimator, Multivariate regression estimator. Product method of estimation. Quenouille method of bias reduction. Introduction to super population models. Properties of Ratio and Regression estimators under super population models. Multiphase sampling.

**UNIT-V:** Four short notes, one from each unit will be asked. Students have to answer any two.

**References :**

1. Freedman,P.,"The Principles of Scientific Research,2nd ed.,new York Pergamon Press,1960

2. Gaum,Carl G.,Graves ,Harod F.,and Hoffman ,Lyme,S.S.,Report Writing ,New York : Barnes & Noble ,Inc,1956.
3. Weller;S.;Romney,A,"Systematic Data Collection ",(Qualitative Research Method Series 10)
4. C.R.Kothari,"Research Methodology", Second Edition, Wishwa Publication, Wiley Eastern Limited, New Delhi.
5. Mukhopadhyay, P. (1998): Theory and methods of Survey Sampling , Prentice-Hall of India Pvt. Ltd. New Delhi.
6. Sukhatme ,P.V. Sukhatme,B.V. Sukhatme S. and Ashok,C.(1984):Sampling Theory of Survey with Applications, IASRI Publication, New Delhi.

## Paper-II (Optional)

### Operations Research

**Unit I** : Definition and scope of Operational Research ; phases in Operations Research; models and their solutions ; decision –making under uncertainty and risk, use of different criteria; The structure and formation of a linear programming problem, Graphical and simplex procedure, Two phase method and Charne's M-method.

**Unit II:** Review of LPP Advanced Linear Programming, Validity Proofs of the Simplex Method , Generalized Simplex Tableau in Matrix Form, Efficient Computational Algorithms, Duality LPP, Goal Programming, A Goal-Programming Formulation, Goal-Programming Algorithms, Integer Linear Programming, Applications of Integer-Programming and Solution Algorithms.

**Unit III**: Decision Environments, Decision-Making under Certainty, Decision-Making under Risk, Decision under Uncertainty. Concept of games and strategy , Pure and mixed strategies, saddle point of a matrix game, Graphical method, Dominance Principle, LPP method for solving games.

**Unit IV : Project Management : PERT and CPM,** Basic Differences between PERT and CPM, Steps of PERT/CPM Techniques, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis, Probability in PERT Analysis Project Time Cost Trade off, Updating of the Project, Resource Allocation.

**UNIT-V**
Four short notes, one from each unit will be asked.  Students have to answer any two.

**REFERENCE :**

1.      Hamdy A. Taha : Operations Research an : Introduction. Prentice-Hall India

2.      J. K. Sharma : Operations Research : Theory and Applications. Macmillan India Limited.

3.      Olvi L Mangasarian : Non Linear Programming : Tata McGraw-Hill Publishing Company Ltd.