

**PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR**  
**SCHOOL OF STUDIES IN STATISTICS**

**Syllabus and Scheme of Examination**  
**Ph. D. Course Work in Statistics, 2019-20**

The Ph.D. Course in Statistics shall be of six months.. This course shall have two papers.. Paper I is theory paper and Paper II is project course work. Each paper is of 100 marks .Theory paper will be of 3 hours duration. In paper II, 40% marks will be assigned to seminar which will be evaluated by departmental research committee and 60% marks will be assigned to project work which will be evaluated by external and internal examiner jointly.

**Scheme of Examination**

Paper	Marks
<b>Paper I : Research Methodology , Quantitative Methods &amp; Operation Research</b>	<b>100</b>
<b>Paper II : Review of Literature concerning the topic of research and Seminar/Project report</b>	<b>100</b>
(a) Seminar	40
(b) Project work and Viva Voce	60
<b>Total Marks</b>	<b>200</b>

**Paper I**

**Research Methodology, Quantitative Methods & Operations Research**

**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 package, SPSS for data analysis.

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

**Unit III :** PPS sampling, Desraj Ordered

Estimates, Murthy Unordered Estimators, Horvitz- Thompson Estimator, Yates-Grundy Estimator, Multistage sampling. Ratio and Regression methods of estimation in various sampling designs.

**Unit IV:** The structure and formation of a linear programming problem, Graphical and simplex procedure, Two phase methods, and Charné's-M method with artificial variables ; duality theorem. Transportation and Assignment problems, Routing and traveling salesman problem. Inventory problems – Deterministic models of inventory , Economic Lot size formula , instantaneous production case , finite production rates situation , cases when shortages are allowed /not allowed. Stochastic inventory models – a single period model with no set up cost.

**Unit V :**

Transportation: Mathematical Model, Methods of finding Initial Solution, North West Corner Method, Least Cost Method, Vogels Approximation Method, Test for Optimality, Dual of Transportation Model, Economic Interpretation of  $u_i$ 's and  $v_j$ 's Modi Method.

Assignment problems- Mathematical Model of Assignment Problem, Solution Method of Assignment Problem- Multiple Optimal Solution Maximization in Assignment Problem, Unbalance Assignment Problem, Routing and traveling salesman problem .

**References:**

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3. Gaum, Carl G., Graves , Harold F., and Hoffman , Lyme, S.S., Report Writing , New York : Barnes & Noble , Inc, 1956.
4. Weller, S.; Romney, A.: Systematic Data Collection (Qualitative Research Method Series 10).
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.
7. Hamdy A. Taha : Operations Research an : Introduction. Prentice-Hall India
8. J. K. Sharma : Operations Research : Theory and Applications. Macmillan India Limited.
9. Olvi L Mangasarian : Non Linear Programming : Tata McGraw-Hill Publishing Company Ltd.