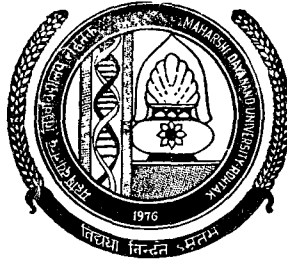


Maharshi Dayanand University Rohtak



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Ordinances, Syllabus and Courses of Reading for M.Sc. (Prev.) Mathematics Statistics Examination

Session—2002-2003

Available from :

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ORDINANCE - 'MASTER OF SCIENCE EXAMINATION'

1. The Master of Science Examination shall be held in two parts. Part-I examination shall be held at the end of the first year and Part-II Examination at the end of the second year.
2. The Examination in Part-I and Part-II shall be held once a year ordinarily in the month of April on such dates as may be fixed by the Vice-Chancellor.
A supplementary examination in Part-II of M.Sc. will be held in December for those candidates who have passed all the papers of part-I examination but have got 'reappear' or have failed or want to improve their score in paper(s) of part-II examination. However, total number of chances will not exceed as given in the Ordinance.
3. The last date for the receipt of admission form and fee without late fee as fixed by the Vice-Chancellor shall be notified to the Heads of the University Teaching Departments and the Colleges concerned.
4. A candidate's admission form and fee may be accepted after the last date on payment of late fee as prescribed from time to time up to the date notified by the University.
No late fee shall be charged if the admission form and fee are received within three working days of grace after the last date for the receipt of the same without late fee.
5. No one shall be eligible to join the first year (Part-I) class of M.Sc. Course unless he has passed one of the following examination:-
 - a) B.Sc. (Hons.) examination of this University with atleast 45% marks in the aggregate in the subject offered for the M.Sc. Course.
 - b) B.Sc. (Pass) examination with atleast 50% marks in the aggregate.
 - c) An examination of any other university recognised by the University as equivalent to (a) or (b) above.Provided that :
 - i) to be eligible to join M.Sc. Course in Physics, a candidate must have passed B.Sc. Examination with Physics and Mathematics as two of the main subjects:

(ii)

- ii) to be eligible to join M.Sc. Chemistry, a candidates must have passed B.Sc. Examination with Chemistry as one of the main subject.

Note : A Minimum of 25% of the total seats shall be filled in by the students who have passed the B.Sc. Examination with Chemistry, Physics and Mathematics. Any seat remaining unfilled out of this-quota may be offered to other eligible candidates

- iii) The eligibility condition for admission to M.Sc. courses shall be as follows :

Bio-Chemistry and Bio-Technology:

B.Sc. (Hons.) exam. of this university in the subject offered for the M.Sc. course or an examination of another University recognised as equivalent thereto with atleast 45% marks in the aggregate.

OR

B.Sc. (Pass) examination of this University or an examination of another University recognised as equivalent thereto with atleast 50% marks in the aggregate provided that a candidate must have passed B.Sc. examination with any three of the subjects Botany, Zoology, Chemistry, Microbiology, Genetics, Environmental Science, Medical Bio-Chemistry, Bio-Technology, Bio-Chemistry, Bio-Chemical Engineering, Fermentation Technology, Food Processing, Medical Laboratory Technology, Industrial Chemistry, Applied Haematology and Industrial Microbiology.

Note :

Out of the three subjects atleast one should be related to Biology.

OR

Bachelor degree with 50% marks in Pharmacy/Home Science/Agriculture/Veternary Science from a recognised University.

M.Sc. (Previous) in Botany, Environmental Sciences, Genetics and Zoology.

- a) B.Sc. (Hons.) examination of this university in the subject offered for the M.Sc. course or an examination of another University recognised as equivalent thereto with atleast 45% marks in the aggregate.

(iii)

OR

- b) B.Sc. (Pass) examination of this University or an examination of another University recognised as equivalent thereto with atleast 50% marks in the aggregate provided that :
- i) to be eligible to join M.Sc. Botany, a candidate must have passed B.Sc. examination with Botany and any two of the subjects viz. Zoology, Chemistry, Microbiology, Environmental Science, Bio-Chemistry, Bio-Technology, Anthropology, Fisheries and Genetics.
 - ii) to be eligible to join M.Sc. Environmental Science a candidate must have passed B.Sc. examination with any three of the subjects viz. Botany, Zoology, Chemistry, Microbiology, Environmental Science, Bio-Chemistry, Bio-Technology, Anthropology, Fisheries and Genetics.
 - iii) to be eligible to join M.Sc. Genetics a candidate must have passed B.Sc. examination with any three of the subjects viz. Botany, Zoology, Chemistry, Microbiology, Environmental Science, Bio-Chemistry, Bio-Technology, Anthropology, Fisheries, Geology and Genetics.
 - iv) to be eligible to join M.Sc. Zoology, a candidate must have passed B.Sc. examination with Zoology and any two of the subjects viz. Botany, Chemistry, Microbiology, Environmental Science, Bio-Chemistry, Bio-Technology, Anthropology, Fisheries and Genetics.
 - iv) conditions for admission to M.Sc. Course in Mathematics shall be same as prescribed for admission viz. M.A. Course in this subject.
 - v) To be eligible to join M.Sc. Course in Geology, a candidate must have passed B.Sc. Examination with atleast 50% marks in the aggregate with Geology and any of two of the subjects viz. Physics, Mathematics, Chemistry, Botany, Zoology, Bio-Science and Geography;
 - vi) to be eligible to join M.Sc. Course in

(iv)

Mathematical Statistics and Operations Research a candidate must have passed B.A./B.Sc. (Pass) Examination with atleast 50% marks in the aggregate with Mathematics or Statistics as one of the subjects or have passed B.A./B.Sc. (Hons.) Examination in Mathematics or Statistics with atleast 45% marks in Mathematics/Statistics.

There shall be a Project Report in M.Sc. Mathematical Statistics (Final) and that the project report shall be evaluated by the external examiner on five point grading. The last date for submission of Project Report will be two months after the theory papers which can be extended further by two months with the permission of the Vice-Chancellor.

Note : A candidate who is placed under compartment in the qualifying Examination shall not be allowed to join M.Sc. Course. He/She will be eligible only after clearing the qualifying Examination.

- 6.1 A candidate who has failed in one or more papers or fails to appear in the examination shall be allowed two additional subsequent chances only to pass the examination.
- 6.2 A candidate who fails to pass the M.Sc. examination within a period of four years of his admission to the course shall be deemed to be unfit for postgraduate studies in the subject concerned.
- 6.3 A person who has passed the M.Sc. (Previous) examination in the subject concerned from this University shall be eligible to join the M.Sc. final class. This is subject to Clause-6.2 above. However, the candidate who have passed atleast two theory papers out of four or five theory papers or atleast three theory papers out of six or seven theory papers of part-I examination of this University will be promoted to Part-II Class provisionally.
7. M.Sc. Examination in Part-I/Part-II shall be open to a student who :-
 - a) has passed the requisite qualifying Examination or is covered under Clause-6 and
 - b) has his name submitted to the Controller of Examinations by the Head of the University Department/Principal of the College. He has

(v)

most recently attended and produces the following certificates signed by him:-

- i) of possessing good character.
 - ii) of having remained on the rolls of the Department/College, during the year preceding the Examination.
 - iii) of having attended not less than 65% of full course of lectures and tutorial separately and 75% of practicals in each part (the course to be counted upto the last day when the classes break up for the preparatory holidays).
8. A candidate whether a regular student or an ex-student shall submit his admission application to the Registrar/Controller of Examination duly signed by the Principal of the College/Head of the University Department he has last attended.
9. Every candidate shall be examined according to the Scheme of examination and syllabus as approved by the Academic Council from time to time.
10. The amount of Examination fee to be paid by a candidate for each part shall be as prescribed from time to time.

Note : A candidate who re-appears in one or more theory or practical papers for the purpose of passing the examination or a candidate who appears in one or more theory papers for the purpose of improvement of score of marks/result shall pay fee as for the whole examination.

11. The medium of instructions and examination shall be English.
- 12.1 The minimum number of marks required to pass the examination shall be as under:-
- i) 33% in each paper (written and practical) separately;
 - ii) 40% in dissertation/viva-voce where prescribed;
 - ii) 40% in aggregate.
- 12.2 A candidate who has completed the prescribed course of instructions in a college/University Teaching Department for Previous/Final examination but has not appeared in it or have appeared fails may be allowed on the recommendation of the Principal of the College/ Head of University Teaching Department concerned to appear in the subsequent years in the

examination paper(s) as the cases may be without attending a fresh course of instructions while re-appearing in the examination, the candidates shall be exempted from re-appearing in the paper(s) and/or practical(s) in which he has obtained atleast 40% marks.

13. As soon as possible, after the termination of the examination the Registrar/Controller of Examinations shall publish the result of the Candidates and issue Detailed Marks Card.

14. The result of candidates who have passed M.Sc. examination shall be classified into divisions, as under and the division obtained by the candidate will be stated in this degree.

- | | |
|--|-----------------|
| a) Those who obtain 60%
or more marks | First Division |
| b) Those who obtain 50% or
more but less than 60% marks | Second Division |
| c) All below 50% | Third Division. |

15.1 A candidate who has passed M.Sc. Previous examination with atleast 55% marks may offer dissertation wherever prescribed in the Scheme of Examination for the course. The subject of dissertation shall to approved by the Head of Department concerned. A candidate shall submit to the Head of the University Department an application for the approval of the topic for the dissertation alongwith a synopsis within one month of his admission to M.Sc. (Final) examination.

Provided in the case of M.Sc. (Geology) exam. there shall be a dissertation based on days field work (surface mapping) in the M.Sc. Previous. The work of dissertation will be done in the M.Sc. previous and viva-voce examination of dissertation will be held at the end of M.Sc. previous alongwith practical examination. Provided further that the condition of obtaining 55% marks in M.Sc. previous examination, for offering dissertation in M.Sc. final shall not be applicable in the case of students of M.Sc. (Geology) course.

15.2 Every candidate who offers dissertation shall be required to submit three copies of his dissertation alongwith a brief abstract of the same giving an

account of the Investigation research conducted and its main finding (which will not exceed 500 words). The dissertation shall be examined by one external examiner only.

15.3 The last date for receipt of the dissertation in the office of the Controller of Examinations shall be one month before the commencement of the theory examination : Provided that in exceptional cases; the Vice-Chancellor shall have the power to extend, on the recommendation of the Head of the Department the last date for receipt of the dissertation upto three months. If a candidate fails to submit the dissertation even during the extended period he will be considered to have absented in the dissertation paper and his result shall be declared accordingly.

15.4 A candidate who has submitted a dissertation as part of his examination may withdraw the same before it has been examined but once it is examined and the candidate obtains the minimum pass marks he shall not be permitted to withdraw it or submit another dissertation in lieu thereof. The marks obtained by him for the dissertation shall be taken into account when he appears in any future examination for the purpose of passing therein or for improving score of marks/result.

16. A candidate who has already passed the Master of Science examination from this University, in a subject in which different optional papers are permitted, may appear in one or more optional paper(s) of that subject at an subsequent examination when held as a regular student only. The examination fee shall be as prescribed from time to time.

Such a candidate shall in order to pass, be required to obtain atleast 40% marks in each paper in theory and practical separately.

17.1 A person who has passed the M.Sc. previous examinations of this University will be allowed to appear as an ex-student in the M.Sc. previous examinations for improvement alongwith M.Sc. final examinations respectively, only once, in one or more theory paper(s) within a period of 3 years of passing M.Sc. previous examination.

(viii)

A person who has passed the M.Sc. examination of this University, and desirous of improving his score of marks will be allowed to appear as an ex-student in the M.Sc. final examinations, for improvement only once in one or more theory paper(s) within a period of two years of his passing the M.Sc. examination. In all a candidate will be allowed to avail one chance within the period specified above. Improvement in practical paper is not permissible.

The result of such a candidate shall be declared only if he improves his score of marks, by taking into account the marks obtained by him in the paper(s) in which he re-appeared and the marks obtained by him earlier in the remaining paper(s).

The fact that the candidate has improved the division shall be mentioned in the Detail Marks Cards. If a candidate opts to appear in both previous and final examinations for the purpose of improvement but finds that he has improved the score of marks obtained by him in the previous examination, he may not appear in the final examination as the case may be and inform the Controller of Examinations for the declaration of his result.

Provided further that the candidate will take the examination according to the syllabus in force for the regular students for that examination. Provided that the syllabus for the candidates for the special examination to be held in September/October shall be the same as was in force for the regular student in the last annual examination.

18. Notwithstanding the integrated nature of this course which is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall held good only for the examination held during or at the end of the academic year and nothing in this ordinance shall be deemed to debar the University from amending the Ordinance and the amended Ordinance, if any, shall apply to all students whether old or new.

19. candidate admitted to M.Sc. Course in 1990-91 or earlier shall be governed by the old rules. The new rules shall be applicable w.e.f. the admission of academic Session 1991-92.

ANNUAL SYSTEM

Scheme of examination for M.Sc. (Mathematical Statistics) 2002-2003. The duration of the course of instruction for M.Sc. (Mathematical Statistics) degree shall be of two years. There will be Four theory papers and two Practical papers in each year. In addition students will have to submit a project work. The detailed scheme of examination for M.Sc. (Mathematical Statistics) (Previous and Final) is as given below.

M.Sc. (Mathematical Statistics) Previous

		Max. Marks	Time
Paper-I	ANALYSIS AND LAPLACE TRANSFORM	100	3 hrs
Paper-II	PROBABILITY AND STATISTICAL METHODS	100	3 hrs
Paper-III	NUMERICAL METHODS, TIME SERIES AND COMPUTER PROGRAMMING	100	3 hrs
Paper-IV	SAMPLING AND DESIGN OF EXPERIMENTS	100	3 hrs
Paper-V	Practicals (Based on paper II and III)	50	4 hrs
Paper-VI	Practicals (Based on Paper-IV)	50	4 hrs

M.Sc. (Mathematical Statistics) Final

Paper-VII	MULTIVARIATE ANALYSIS AND ECONOMETRICS	100	3 hrs
Paper-VIII	STATISTICAL INFERENCE	100	3 hrs
Paper-IX-X	ANY TWO OF THE FOLLOWING	200	3 hrs
Opt. (i)	STOCHASTIC PROCESSES AND QUALITY CONTROL		
(ii)	METHODS OF OPERATIONS RESEARCH		
(iii)*	ADVANCED DESIGN OF EXPERIMENTS		
(iv)*	THEORY OF SAMPLE SURVEY		
(v)*	COMPUTER PROGRAMMING		

Paper-XI Practical (Based on Paper-VII)	50	4 hrs
Paper-XII Practical (Based on Paper-VIII)	50	4 hrs

PROJECT WORK : The project work will start in the beginning of M.Sc. (Final) under approved supervisors from amongst members of the staff. The last date for submission of Project work will be two months after the theory papers. However, the result may be communicated to the students independent of project work. The evaluation will be done by single external examiner on the basis of project work and Viva-voce.

* Syllabi of these papers will be framed later on

PAPER-I ANALYSIS AND LAPLACE TRANSFORM

UNIT - I (Thirty percent)

Functions of complex variables and its analytic properties, Cauchy's-Riemann equations. Power series and its radius of convergence. Complex integrals, Cauchy's Theorem, Morera's Theorem, Cauchy's Integral formulae and its inequality Liouville's Theorem. Taylor and Laurent's series.

Singularities and its classification. Poles and zeros of a meromorphic function, argument's principle, Rouché's Theorem, Fundamental Theorem of algebra. Residues, Cauchy's residue theorem for integral and their applications to evaluation of real valued integrals.

Unit - II (Twenty percent)

Sequences of functions and their uniform convergence. Functions of bounded variation and its representation as difference of monotonic functions. Riemann-Stieltjes integral of a real valued function with respect of a monotonic function and its properties.

Laplace and inverse Laplace transform and their basic properties, convolution theorem. Application of Laplace transform to the solution of linear ordinary differential equations. Difference equations and their solution with constant coefficients.

Unit - III (Thirty percent)

Measure and probability measure on a field and sigma-field,

Outer measurability of sets, construction of outer measure using sequential covering classes, Lebesgue and Lebesgue-Stieltjes measure on the real line, construction of non-measurable sets.

Measurable function by considering random variable as a measurable function. Sequences and algebra of measurable functions, Approximation Theorem, concept of almost everywhere (a.e.) and almost uniform convergence, Egoroff's Theorem, Lusin's Theorem, Convergence in measure, F. Riesz theorem for convergence in measure.

UNIT - IV (Twenty percent)

Integration of a measurable function's with respect to a measure, bounded convergence theorem, Fatou's lemma, Monotone convergence theorem, Dominated convergence theorem. Signed measures, Jordan-Hahn decomposition theorem, Random Nikodym theorem (statement only) and its applications to probability density function. Product measure, iterated integrals and Fubini theorem.

BOOKS SUGGESTED

1. Copson, E.T. : Introduction to the theory of Functions of complex variable
2. Pati, T. : Functions of Complex Variable
3. Narayan, S : A Course of Mathematical Analysis
4. Royden, H.L. : Real Analysis
5. Rudin, W. : Principle of Mathematical Analysis
6. Williams, J : Laplace Transforms

ADDITIONAL BOOKS

7. Halmos, P.R. : Measure Theory
8. Kingman, J.F.C. & Taylor, S.J. : Measure & Probability

Note : Question paper will consist of three sections. Section-I consisting of one question with ten parts of 2 marks each covering the whole syllabus shall be

compulsory. In Section-II, 10 questions will be set selecting atleast two questions from each unit. The candidates will be required to attempt any seven questions each of five marks. In Section-III, five questions will be set atleast one from each unit. The candidates will be required to attempt any three questions each of 15 marks.

PAPER - II PROBABILITY AND STATISTICAL METHODS

UNIT - I (Thirty percent)

Various definitions of probability, Addition and Multiplication theorem. Boole's and Bonferroni's inequalities. Conditional probability. Baye's theorem, Independence of events.

Random variables and distribution functions. Probability mass function, Probability density function, Two dimensional random variables : Joint Marginal and Conditional distributions. Independence of random variables.

Probability and Moment generating function Characteristic function and their elementary properties. Inversion and uniqueness theorems of characteristic function.

Moments of random variable : Expectation Variance Covariance Conditional expectation, Moment-Inequalities of Holder, Jenson, Cauchy-Schwartz and Lyapunov.

UNIT - II (Twenty percent)

Modes of convergence. Convergence in probability, mean square, distribution and almost sure convergence. Probability inequalities of Markov and Tchebychev. Weak law of large numbers : Tchebychev's Bernoulli and Khintchin's theorems. Borel Cantelli Lemma, Kolmogrov inequality Strong Law of large numbers. Central limit theorems of Demoiivre-Laplace and Lindberg Levy.

UNIT - III (Thirty percent)

Probability distributions : Binominal, Poisson, Multinomial, Hyper geometric, Geometric, Negative Binominal, Uniform, Exponential, Laplace, Cauchy, Beta, Gamma, Normal (Univariate and Bivariate) and Lognormal distributions.

Analysis of Categorical data : Consistency of categorical data, Independence and association of attributes. Correlation

and Regression. Correlation ratio. Intra class correlation. Partial and Multiple correlations, Principle of least squares - fitting of curves.

Sampling distributions of Mean Variance, Chi-square, Student's and Snedecor's F, Fisher's -Z distribution and their applications. Elementary ideas of non-central distributions.

UNIT - IV (Twenty percent)

Measures of mortality : CDR, age-SDR and STDR, Infant mortality rate.

Measures of Fertility : CBR, GFR, age- SFR and TFR. Gross reproduction rate. Net reproduction rate. Life tables and its applications; Methods of construction of abridged life table Reed-Merrel, Grevilles and King's Methods Stable population, Age pyramid of sex composition, Reduction of Mortality curves : Gompertz's and Make ham formulae, logistic curve and it's use in Population Projection.

BOOKS SUGGESTED

- | | |
|--|---|
| 1. Meyer, P.L. | Introductory Probability and Applications. |
| 2. Rohtagi, V.K. | An Introduction to Mathematical Statistics. |
| 3. Freund, JE | Mathematical Statistics |
| 4. Mood A M, F A
Graybill & D C Boes | Introduction to the theory of Statistics |
| 5. Mukhopadhyay P | Applied Statistics |
| 6. Goon A.M. M.K.
Gupta and B. Dasgupta | Fundamentals of Statistics
Volume-II |

Note : Question paper will consist of three sections. Section-I consisting of one question with ten parts of 2 marks each covering the whole syllabus shall be compulsory. In Section-II, 10 questions will be set selecting atleast two questions from each unit. The candidates will be required to attempt any seven questions each of five marks. In Section-III, five questions will be set atleast one from each unit. The candidates will be required to attempt any three questions each of 15 marks.

PAPER - III NUMERICAL METHODS, TIME SERIES AND COMPUTER PROGRAMMING

UNIT - I (Thirty percent)

Numerical differentiation and integration : Trapezoidal, Simpson's $1/3$ rd and $3/8$ th rules, Cote's formulae, error estimation of Simpson's $1/3$ rd rule with end correction, Richardson extrapolation, Romberg integration, Evaluation of eigen-values and eigen-vector's of matrices by power and Jacobi's method. Solution of ordinary differential equation : Taylor's series, Euler, Picard and Runge-Kutta method, predictor-corrector methods, boundary value problem.

UNIT - II (Twenty percent)

Time Series and its components. Analysis of time series data. Determination of trends by use of polynomial, modified exponential, logistic, Gompertz and lognormal curves. Moving average method, Spencer's formula Measurement of Seasonal variations. Measurement of cyclical movement : periodogram analysis serial correlations and correlogram analysis correlogram of Auto regression and Moving Average process, lag correlation Variate difference method.

Demand Analysis - Demand and Supply curves. Price elasticity of demand and supply. Determinations of demand from market data income elasticity of demand. Engle Curve and its different forms, methods of differentiation of Engle Curve, variation in house hold size and composition.

UNIT - III (Thirty percent)

Computer and its structures, Computer oriented procedure. Flow-Charts High Level languages. Introduction to FORTRAN 77 Characters used in FORTRAN Arithmetic Statements, If, Do, Read, Write and Format Statements. Sub programming and function subroutine, Computer programming in FORTRAN 77 for solving simple problems.

UNIT - IV (Twenty percent)

Over view of C programming language: constants, variables and data types operators and expressions, Managing input and output operations; decision making and branching;

decision making and looping; array, handling of character string; user define functions; brief introduction to structures and pointers.

BOOKS SUGGESTED

1. Sastry, S.S. Introductory Methods of Numerical Analysis
2. Kumar, K.S. Numerical Analysis
3. Nielson, K.L. Methods of Numerical Analysis
4. Gupta S.C. and Kapoor Fundamental of Applied Statistics
5. Goon, A.M. Gupta A.K. Fundamental Statistics of Vol-II and Dass Gupta B
6. E. Balaguruswamy Programming in C
7. D.M. Dhandhell Introduction to System Software
8. Gohfriend C Programming
(Shaum Series)

Note : Question paper will consist of three sections. Section-I consisting of one question with ten parts of 2 marks each covering the whole syllabus shall be compulsory. In Section-II, 10 questions will be set selecting atleast two questions from each unit. The candidates will be required to attempt any seven questions each of five marks. In Section-III, five questions will be set atleast one from each unit. The candidates will be required to attempt any three questions each of 15 marks.

PAPER-IV SAMPLING TECHNIQUES, LINEAR ESTIMATION AND DESIGN OF EXPERIMENTS**UNIT - I (Thirty percent)**

Sample versus complete enumeration, designing of Sample Surveys, Sources of error in non-response and measurement, probability and purposive sampling, simple random sampling with or without replacement for the estimation of mean total, proportion and ratio, determination of sample size, stratified sampling : Proportional and optimum allocation. Estimation of gain due to stratification. Construction of strata and determination of number of strata, Ratio Estimates, Approximate variance, comparison with mean per unit estimate. Conditions under which it is optimum, Bias of the ratio type estimate, Unbiased ratio type estimate due to Hartley and Ross, Ratio Estimate in stratified sampling. Regression Estimators (Pre-assigned and estimated from the sampling) comparison with the ratio and mean per unit estimates, regression estimates in stratified sampling. Double sampling (two phase sampling) for ratio and regression methods of estimation.

UNIT - II (Twenty percent)

Systematic sampling, comparison with stratified and simple random sampling, single stage cluster sampling. variance in terms of inter cluster correlation, Jessen's cost function and determination of optimum sampling unit. Sampling with varying probabilities with replacement, Estimation of the total, its variance and variance estimate. Sampling with probability proportional to size, Lahiri Method of selection, Hurvitz Thompson Estimator, Its variance and unbiased estimate of this variance. Two stage sampling, Estimate of population Mean and its variance, optimum allocation for fixed cost.

UNIT - III (Twenty percent)

Linear Models, standard Gauss Markov models, estimability of parameters, best linear unbiased estimate (BLUE), methods of least squares and Gauss-Markov theorem, variance covariance matrix of BLUE.

Analysis of Variance for one way, two way with one/m observation per cell for fixed, mixed and random effect models, Tukey's test for non additivity.

General theory of Analysis of experimental designs; completely randomized block and latin square designs. Analysis of covariance for CRD and RBD.

UNIT - IV (Thirty percent)

Factorial experiments confounding and fractional replication, split and strip plot designs, missing plot techniques. Incomplete block designs; balanced connectedness and orthogonality, BIBD with recovery of inter block information, construction of orthogonal latin squares and BIB designs; Youden squares.

BOOKS SUGGESTED

1. Chochran, W.G. Sampling Techniques
2. P.V. Sukhatme & B.V. Sukhatme Sampling theory
3. Daroga Singh & F.S. Chaudhary designs Theory & Analysis of Sample Survey
4. Morris H. Hansen, William Hurwitz, William G. Madow Sample Survey Methods & Theory Vol-I and II
5. Mukhopadhyay, Parimal Theory and Methods of Survey Sampling
6. Das and Giri Design of Experiments
7. Goon, A.M. Gupta, M.K. & Das Gupta Outline of Statistics Vol-II
8. Goon, A.M. Gupta, M.K. & Das Gupta Fundamental of Statistics
9. D. Montgomery Design and analysis of Experiments
10. Alope Dey Analysis of Block Design

Note : Question paper will consist of three sections. Section-I consisting of one question with ten parts of 2 marks each covering the whole syllabus shall be compulsory. In Section-II, 10 questions will be set selecting atleast two questions from each unit. The candidates will be required to attempt any seven questions each of five marks. In Section-III, five questions will be set atleast one from each unit. The candidates will be required to attempt any three questions each of 15 marks.