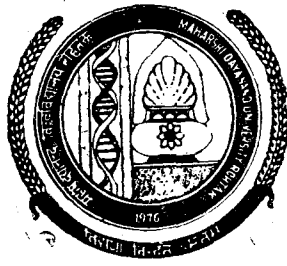


**Maharshi Dayanand University
Rohtak**



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**Ordinances, Syllabus and Courses of
Reading for ^{rew}
Mathematics/M.Sc. (~~Final~~)
Examination**

Session—~~1997-98~~

1999-2000

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Maharshi Dayanand University
Rohtak-124001 (Haryana)

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At the Counter **Rs. 50/-**
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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 Rs. 105/- 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) to be eligible to join M.Sc. Chemistry, a candidate 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) to be eligible to join M.Sc. course in Bio-Science, a candidate must have passed B.Sc. Examination with Botany, Zoology, Bio-Sciences and any one of the subjects viz. Chemistry, Bio-Chemistry, Micro-Biology Fisheries and Geology.

Note: The candidates will be required to opt for Animal Sciences or Plant Sciences or Environmental Biology in M.Sc. final course which will be allowed after taking into consideration the performance of the candidate in M.Sc. previous examination. However, an indication to this effect will be required to be given by the candidate at the time of his admission.

- 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 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 candidates 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 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 Examinations 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 follows:-

Regular student	Ex-student
Rs. 100/-	Rs. 110/-

Note:- Plus Rs. 20/- per practical subject.

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;
 - iii) 40% in the 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 candidate shall be exempted from re-appearing in the paper(s) and/or practical(s) if 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 his 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 at least 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 maping) 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 findings (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 Rs. 35/- each paper.

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.

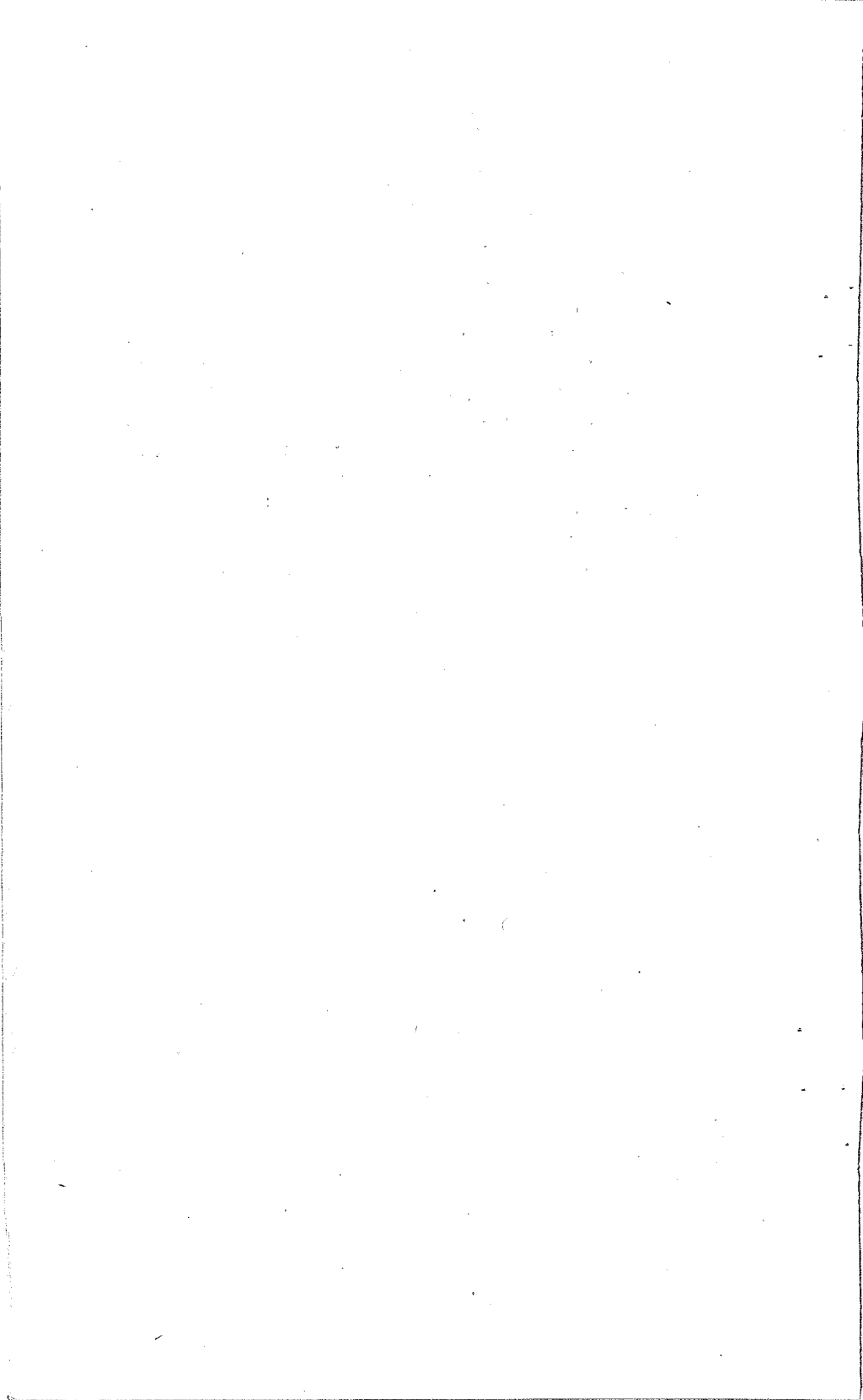
A person who has passed the M.Sc. examination of this University, and desirous of improving his score of marks will be allowed to appear as an ex-student in the M.Sc. final examinations, for improvement only once in one or more theory paper(s) within a period of two years of his passing the M.Sc. examination. 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.



Scheme of Examination for M.A./M.Sc.(Mathematics)

The duration of the course of instructions for M.A. / M.Sc. (Mathematics) degree shall be two years. There will be five papers in each year course. The detailed scheme of examination for M.A. / M.Sc. (Previous) Mathematics and M.A. / M.Sc.(Final) Mathematics is as given below:-

M.A./M.Sc. (Mathematics) Previous

		Max. Marks	Time
Paper-I	Real Analysis	100	3 hours
Paper-II	Algebra	100	3 hours
Paper-III	Mechanics and Calculus of Variations	100	3 hours
Paper-IV	Differential and Integral Equations	100	3 hours
Paper-V	Complex Analysis and Differential Geometry	100	3 hours

M.A./M.Sc. (Mathematics) (Final)

Paper-VI	General Topology	100	3 hours
Paper-VII	General Measure Theory and Functional Analysis.	100	3 hours
Paper-VIII	Statistical and Numerical Methods and Computer Programming	Theory 70 Practicals 30	3 Hrs. 4 Hrs.

(Computer Programming
based on Statistical and
Numerical Methods)

Paper-IX & X Two papers to be offered out of either of the following groups:

Applied Group

- A₁ Fluid Dynamics
- A₂ Theory of Elasticity
- A₃ Electro Magnetic Theory
- A₄ Magnetohydro-dynamics
- A₅ Mathematical Statistics
- A₆ Theory of Relativity
- A₇ Mathematical Methods
- A₈ Theoretical Seismology
- A₉ Continuum Mechanics

Pure Group

- P₁ Theory of Numbers
- P₂ Theory of Groups and Fields
- P₃ Operator Theory
- P₄ Applied Algebra
- P₅ Computer Mathematics
- P₆ Probability Theory
- P₇ Differential Manifolds
- P₈ Calculus on Banach Spaces
- P₉ Approximation Theory
- P₁₀ Fourier Analysis
- P₁₁ Algebraic Topology and Category Theory

M.A./M.Sc. Mathematics (Previous)**Paper-I Real Analysis**

Max. Marks : 100

Time : 3 Hours

Section-I (Two Questions)

Functions on \mathbb{R}^n , Differentiation on functions on \mathbb{R}^n . Partial derivatives, Higher order differentials. Taylor's Theorem. Explicit and Implicit functions. Implicit function theorem and Inverse function theorem. Change of variables. Extreme values of explicit and stationary values of implicit functions, Lagrange's multipliers methods. Jacobians and its properties.

Section-II (Three Questions)

Set functions. Intuitive idea of measure. Elementary properties of measure. Counting measure. Measurable sets and their fundamental properties. Lebesgue measure of sets of real numbers. σ algebra of measurable sets. Borel sets. Equivalent formulations of measurable sets in terms of open, closed, G_δ and F_σ sets. Non-measurable sets. Measurable functions and their equivalent formulations. Properties of measurable functions. Approximation of measurable functions by sequences of simple functions. Measurable functions as nearly continuous functions. Egoroff's theorem, Lusin's theorem, convergence in measure and F. Eiesz theorem for convergence in measure.

Section-III (Three Questions)

Riemann Integral and its shortcomings. Lebesgue Integral of a bounded function over a set of finite measure and its properties. Lebesgue Integral as generalization of Riemann Integral, Bounded convergence theorem. Lebesgue theorem regarding points of discontinuities of Riemann integrable functions. Integral of non-negative function, Fatot's lemma. Monotone convergence theorem. General Lebesgue integral, Lebesgue convergence theorem and its generalizations. Vitalli's lemma, differentiation of monotonic

functions. Functions of bounded variation and its representation as difference of monotonic functions. Differentiation of indefinite integral. Fundamental theorem of Calculus. Absolutely continuous functions and their properties.

Sections IV (Two questions)

Trigonometric series, Fourier series associated to a Lebesgue Integral periodic function. Fourier coefficients. Convergence problem of Fourier series. Dirichlet's Integral, Riemann Lebesgue theorem. Dini's Jordan's and de la Valee-Pousson's test of convergence. Convergence through out the interval. Fejer's Theorem of summability of Fourier series by arithmetic means, Fejer-Lebesgue theorem, Continuous function with a divergent Fourier series. Integration of Fourier series. Parseval's theorem. Functions of class L^2 : Bessel's inequality Riesz-Fischer theorem.

Books Suggested

- | | |
|---------------------|-----------------------------------|
| 1. Phillips .E.G. | A Course of Mathematical Analysis |
| 2. Royden, H.L. | Real Analysis |
| 3. Halmos, P.R. | Measure Theory |
| 4. Titchmarsh, E.C. | The Theory of Functions. |

NOTE: The questions paper will consist of ten questions as indicated. The candidate will be required to attempt five questions selecting at least one question from each section.

Paper-II Algebra

Max. Mark : 100

Time : 3 Hrs.

Section I (Two Questions)

Fundamental Theorem of Arithmetic congruences. Euler's function $\phi(n)$, Euler-fermat theorem. Solutions of $ax \equiv b \pmod{m}$, order modula primitive roots of primes.

Modules, submodules, homomorphism and isomorphism of modules, quotient modules, Hom (M,N) and algebra of linear transformations.

Section II (Three Questions)

Groups, subgroups, cosets, Lagrange's theorem, homomorphism, normal subgroups, quotient groups, Isomorphism theorems, Cauchy's theorem for abelian groups simplicity of A_n for $n > 5$.

See slip

Section III (Two questions)

Rings, subrings, ideals, skew fields, integral domains and their fields of quotients, characteristic of a field and prime fields, Euclidean rings, polynomial rings, Eisenstein's irreducibility criterion, unique factorization domains.

Section IV (Three questions)

Finite dimensional real and complex inner-product spaces. Cauchy-Schwartz inequality, Orthonormal basis, self adjoint, unitary and normal transformations. Real quadratic forms and complex Hermitian forms. Signature of real quadratic forms. Positive definite, semi-definite and negative definite quadratic forms. Sylvester's law of inertia, Triangular, Jordan and rational canonical-forms for a matrix.

Books Suggested

1. P.B.Bhattacharya and S.K. Jain First course in rings, Fields and Vector spaces (Wilay Eastern)
2. P.M. Cohn Algebra, Vol. I & II (John Wilay)
3. I.N.Herstein Topics in Algebra (Vikas)
4. B.W.Jones Linear Algebra (Olden Day)
5. Hoffman & Kunze Linear Algebra (Prentice-Hall Inc.)
6. S.Lange Linear Algebra (Addison-Wilay)
7. Surjeet Singh & Quazi Zameeruddin Modern Algebra (Vikas)
8. Krishnamurthy, Mainra and Arora An Introduction to Linear Algebra (Affiliated East-West Press)
9. N.H.Maccoy The Theory of numbers (Macmillan)

NOTE: The question paper will consist of ten questions as indicated. The candidate will be required to attempt five questions, selecting atleast one question from each section.

Paper-III Mechanics and Calculus of Variations Max. Marks : 100
Time : 3 Hrs.

Section I (Three Questions)

Statics. Virtual work. Forces in three dimension. Conditions of equilibrium. Constrained bodies. Principle of Virtual work. Work function. Poinso's central axis. Wrench. Reciprocal Screws. Nul lines and nul planes. (Sections 100-106, 162, 194, 203-209 of Loney's book).

Section II (Two Questions)

Curvilinear co-ordinates. Orthogonal curvilinear coordinates, Gradient, Divergence, Curl and Laplacian operator in term of Curvilinear, Cylindrical and spherical polar coordinates.

Calculus of Variations. Lagrange's multipliers, Euler-equation. Stationary function. Natural boundary and transition conditions. Variational notation. Functionals. Variable end points. Sturm-Liouville problem. Hamilton's principles (Sections 2.1-2.10 of Hildebrand's book).

Section III (Two questions)

Dynamics of particle. Velocity and acceleration of a particle along a curve. Radial and transverse components. Relative velocity and acceleration. Angular velocity. Composition of angular velocities. Moving axes. Instantaneous axis and centre of rotation.

Motion of a particle under a central force. Differential equations for a central orbit in polar and pedal coordinates. Kepler's laws. Newton's law of gravitation. Disturbed orbits.

Linear and angular momentum of a system of particles. Impulsive forces (Section 2.1.2.10, 5.1-5.5, 6.1-6.5 of Charlton's book.)

Section IV (Three questions)

Dynamics of rigid body. Moments and Products of inertia. Theorems of parallel and perpendicular axes. Principal axes, Momental ellipsoid. Coplanar distributions.

Euler's dynamical equations. Rigid body motion under no forces.

Generalized co-ordinates. Generalized velocities. Virtual work and generalized forces. Lagrange's equations of a holonomic system for conservative forces and for impulsive forces. Kinetic energy as a quadratic function of velocities. Small oscillations of conservative holonomic dynamical systems. (Sections 7.1-7.8, 9.1-9.3, 10.1-10.12 of Charlton's book).

The Hamilton-Jacobi equations (Section 10.2 of Synge and Griffith's book)

Books Suggested

- | | |
|----------------------------------|---------------------------------|
| 1. Loney, S.L. | Elementary Treatise in Statics |
| 2. Narayan, S. | A Test Book of Vector Calculus. |
| 3. Hildebrand, F.S. | Methods of Applied Mathematics |
| 4. Charlton, F. | Test book of dynamics |
| 5. Synge, J.L. and Griffith, B.A | Principles of Mechanics |

NOTE: The question paper will consist of ten questions as indicated. The candidate will be required to attempt five questions, selecting atleast one question from each section.

Paper-IV Differential and Integral Equations.

Max. Marks : 100

Time : 3 Hrs.

Section I (Three Questions)

Linear differential equations, methods of undetermined coefficients and variation of parameters, reduction of order of a linear differential equations, general properties of solutions of linear differential equations of order n , Wronskian, linear dependence and independence of solutions.

System of simultaneous equations of the type $dx/P=dy/Q=dz/R$, total differential equations.

Adjoint and self-adjoint equations, Lagrange's identity, Green's function, Sturm-Liouville's boundary value problems, eigen functions and eigenvalues, expansion in eigenfunctions, Sturm's comparison and separation theorems.

Section II (Two Questions)

Integration in series: Power series solution of linear differential equations about an ordinary point, regular singular point and the point at infinity.

Hypergeometric functions: Hypergeometric differential equation and its solution in series, Hypergeometric function and its simple properties.

Bessel functions: Bessel equation and its solution in series, Bessel functions, generating function, recurrence relations, integral representations of $J_n(x)$, addition formula for $J_n(x)$, orthogonality of Bessel functions, expansion of a function in a series of Bessel functions, Behaviour of $J_n(x)$ for large values of x .

Legendre functions: Legendre equation, Legendre polynomials and Legendre functions, Rodrigue's formula generating functions, recurrence relations, orthogonality of Legendre polynomials, definite integral representation of $P_n(x)$, expansion of a functions in a series of Legendre polynomials, behaviour of $P_n(x)$ for large values of n .

Section III (Three Questions)

Formation of partial differential equations, classification of integrals of first order equations, Lagrange's linear equations, determination of surfaces orthogonal to a given system of surfaces, compatible systems of first order equations, Charpit's method special types of first order equations, solutions satisfying given conditions, Jacobi's method.

Second order linear equations with constant coefficients, equations with variable coefficients, classification of second order equations with two independent variables and reduction to canonical forms, Monge's method for the solution of nonlinear equations.

Solutions of laplace, wave and heat equations (Cartesian coordinates only) by the method of separation of variables with reference to boundary value problems.

(Section 2.1,2.2,2.4-2.7,2.9-2.13,3.1,3.4,3.5,3.9-3.11,4.5,5.4 and 6.4 of Sneddon's Book)

Section IV (Two Questions)

Linear integral equations: Volterra and Fredholm integral equations of different kinds, initial and boundary value problems reduced to integral equations, methods of successive substitution and approximations for the solution of integral equations of second kind, laplace transform method, solution of volterra equation of the first kind, Neumann series, homogeneous and nonhomogeneous Fredholm equations with separable kernels, approximation of a kernel by a separable kernel, methods of resolvent and iterated kernels for fredholm equations of second kind.

Books Suggested

- | | |
|---------------------|---|
| 1. Jerri, A.J. | Introduction to Integral Equations with Applications. |
| 2. Hildebrand, F.B. | Methods of Applied Mathematics |
| 3. Ross, S.L. | Differential equations. |
| 4. Sen, B. | Treatise on special functions for scientists and engineers. |
| 5. Sneddon, I.N. | Elements of partial Differential Equations |
| 6. Sneddon, I.N. | Special functions of mathematical physics and Chemistry. |

Note: The question paper will consist of ten questions as indicated. The candidate will be required to attempt five questions, selecting at least one question from each section.

Paper-V Complex Analysis and Differential Geometry

Max. Marks : 100
Time : 3 Hrs.

Section I (Three Questions)

Analytic functions, Cauchy Riemann Equations in cartesian and Polar Coordinates. Circle and Radius of Convergence of Power Series, term by term differentiation of a Power series within its circle of convergence. Complex integration, integration along a regular arc. absolute value of complex integral, Cauchy's Theorem, Cauchy's Integral Formula, derivative of an analytic functions, Morera's Theorem, Cauchy's Inequality Liouville's Theorem, Taylor's and Laurents Theorem isolated singularities of an analytic functions, limit points of zeros and poles, Weierstrass-Theorem about the

behaviour of an analytic function near an isolated essential singularity. Cauchy's Residue Theorem and its application to the evaluation of definite integrals.

Section II (Two Questions)

Poles and zeros of a meromorphic functions, Argument Principle, Rouchy's Theorem, Fundamental Theorem of Algebra, Hurwitz's Theorem, level curves and zeros of $f(z)$, Poisson's Integral Formula, Expansion of Meromorphic functions by Mittag-Leffler's Theorem and its application to trigonometric functions. Maximum Modulus Principle and Minimum Modulus Principle, Schwarz's Lemma, Hadamard's Three Circle Theorem and its convexity form.

Section III (Two Questions)

Integral function, Factorization of Integral function, Weierstress's Theorem concerning the construction of integral function. Definition and uniqueness of analytic continuation. Power Series Method for analytic continuation, Natural Boundaries, Branch Points and Branch Lines, Riemann surfaces. Isogonal and Conformal Mappings, Critical Points, Bilinear Transformation. Transformation of a circle, conformal representation of a half plane on a circle.

Section IV (Three Questions)

Laplace Transform, Existence Theorem and properties, Laplace transform of various functions, Inverse Laplace Transform and its properties, convolution Theorem, Inversion theorem, Solution of ordinary differential equations using Laplace Transforms, Fourier Integral Theorem, Fourier Transforms and its Properties, Fourier transforms of simple functions, convolution Theorem, Application of Fourier transforms to solve ordinary differential equations.

Differential Geometry of curves in space, Serret-Frenet Formula. Spherical curvature and locus of its centre. Envelopes, Edge of regression, curvi-linear coordinates, First and Second order Magnitudes (Sections-1-6,13-16 and 22-27 of Weatherburn's Book).

Books Suggested

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|----------------------|---|
| 1. Copson, E.T. | An Introduction to the Theory of functions of a complex Variable. |
| 2. Sneddon, I.N. | Use of Intergral Transforms |
| 3. Titchmarsh. E.C. | The Theory of Functions. |
| 4. Weatherburn, C.E. | Differential Geometry of Three Dimension. |
| 5. Williams, J., | Laplace Transforms. |

NOTE: The question paper will consist of ten questions as indicated. The candidate will be required to attempt five questions, selecting at least one question from each section.