RADHA GOVIND UNIVERSITY

RAMGARH, JHARKHAND

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM POSTGRADUATE COURSES

UNDER CHOICE BASE CREDIT SYSTEM

M. SC.

With effect from 2018-20

RADHA GOVIND UNIVERSITY, RAMGARH

Radha Govind University, Ramgarh, Jharkhand
Department of Mathematics

PROGRAM: POST GRADUATE

Vision & Mission

Vision:

Aspires to be one of the top most Mathematics Departments in the country and compete globally as a centre of Teaching and Research in Mathematics.

Mission:

M1:To impart world-class education in an environment of fundamental and applied research in Mathematics.

M2: To conduct cutting–edge research to create new knowledge and to spread this knowledge through publications in reputed leading journals.

M3: To prepare the professional groups in Mathematics to support the national development programs within the public and centres of higher learning.

M4: To develop human potential to its fullest extent so that scholarly competent and very talented captains can emerge in various professions.

Program Educational Objectives (PEO's)

The objectives of the M.Sc. (Mathematics) Programme are to develop students with the following capabilities:

PEO1: To provide students with knowledge and capability in formulation and analysis of mathematical models of real life applications.

PEO2:To provide student's with advanced mathematical and computational skills that prepare them to pursue higher studies and conduct research.

PEO3: To provide with individual and team work that prepare them to function as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

PEO4 :To provide with usage of modern tools that prepare them to create, select and apply appropriate techniques, resources, and modern mathematical activities with an understanding of the limitations.

Program Outcomes (PO's)

On successful completion of the M.Sc. (Mathematics) Programme, students will be able to:

PO1:**KNOWLEDGE** : Communicate mathematical ideas effectively and lucidly in writing as well as orally.

PO2: **PERPETUAL LEARNING** : Pursue research or careers in industry, mathematical sciences and allied fields.

PO3: **SKILL** :Acquire relevant knowledge and skills appropriate to professional activities and demonstrate the highest standards of ethical issues in mathematical sciences.

PO4 :**ETHICAL VALUES** : Become an enlightened citizen with a commitment to deliver one's responsibilities within the scope of bestowed rights and privileges.

PO5:**PROBLEM SOLVER/ THINKER**: Inculcate critical thinking to carry out scientific investigation objectively without being biased with preconceived notions.

PO6:**DIGITAL LEARNER**:Have sound knowledge of mathematical modelling, programming and computational techniques as required for employment in industry.

PO7: **INQUISITIVE**: Possess a strong foundation in core areas of Mathematics, both pure and applied.

PO8: **THINKER :** Think mathematically in a critical manner.

PO9: **COMMUNICATOR**: Communicate Mathematics accurately, precisely and effectively.

PO10: **AWARENESS**: Develop a range of generic skills helpful in employment, internships and social activities.

PO11: **RESEARCH / INNOVATIVE** : Undertake further studies in Mathematics and its allied areas on multiple disciplines concerned with Mathematics.

PO12:**JOB OPPORTUNITIES**: Students will become employable; they will be eligible for career opportunities in Industry, or will be able to opt for entrepreneurship.

Program Specific Outcomes (PSO's)

After completing the Programme, the students will be able to:

PSO1: Take part and qualify for the state and national level competitive examinations such as SET, CSIR-UGC NET, GATE, NBHM ,ISRO, DRDO, NAL, ICT etc.

PSO2: Join higher education for Ph. D. Programme and for a variety of jobs both in the industry and in academic institutions all over the world.

PSO3: Student should be able to apply their skills and knowledge that is translate information presented erbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. I Semester

Course Title	**MODERN ALGEBRA**
Type of Course	**Theory, Paper I**
Course Assessment	**Semester Tests -30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
Unit I - Group Theory Groups Finite permutation groups S_5 and A, Normal and Subnormal series, Jordan-Holder theorem, Solvable groups, Nilpotent groups. Group action, orbit -stabilizer theorem, Sylow's theorems (proofs using group actions). .	02
Unit II- Linear Algebra Matrix of a linear transformation, Canonical Forms — Similarity of linear transformations. Invariant subspaces. Eigen values and Eigen vectors, Reduction to diagonal, triangular and Jordan forms. The primary decomposition theorem	02
Unit III — Field Extension Field theory-Extension fields, finite extension, Algebraic and transcendental extensions. splitting fields-existence and uniqueness, Separable and inseparable extension. Normal extensions. Perfect fields.	02
Unit IV — Finite Field Finite fields, Theorems on finite fields, Primitive elements. Algebraically closed fields. Automorphism of extensions, Galois extension. Fundamental theorem of Galois Theory.	02

Textbooks* /Reference Books	▫ D.S. Dummit, R.M. *Foote,Abstract Algebra* —John Wiley&Sons (2003) I.N. ❑ Herstein. *Topics in Algebra,* Wiley Eastern Ltd., New Delhi, 1975 ▫ M. Artin. *Algebra,* Prentice-Hall of India, 1991. ▫ K. Hoffman and R. Kunze (2" *edition),Linear Algebra,* Prentice Hall of India, New Delhi (1997) ▫ N.S. Gopala Krishnan, *University Algebra,* New Age lnt.Publ. ▫ William J Gilbert, Madern Algebra with Applications, Wiley India, 2005.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. I Semester

Course Title	**Real Analysis**	
Type of Course	**Theory, Paper II**	
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**	
Contents of Syllabus		**No of Questions**
UNIT 1: Definition **and** existence of Reiemann Stieltjes integral Properties of the Integral Integration and differentiation the fundamental theorem of Calculus (Fourier series Bessels inequality. Perseval theorem, Fourier series representation of functions		02
UNIT II: Sequences and series of functions pointwise and uniforin convergence Cauchy criterion for uniform convergence Weierstrass M test, Abel's and Dirichlet s test for uniform convergence and continuity uniform convergence		02
UNIT III: Riemann Stieltjes integration uniform convergence and differentiation, Weierstarss approximation theorem Power Series uniqueness theorem for power series Abel s and Tauber's theorem		02
UNIT IV: Functions of several variables linear transformation Derivatives in an open subset of R Chain rule Partial derivatives interchange of the order of differentiation Derivatives of higher orders Young theorem Schwartz theorem Taylor's theorem, Inverse function theorem Implicit function theorem Jacobians		02
Textbooks */ Reference Books	1 Walter Rudin Principles of Mathematical Analysis (3rd edition) Mc Graw-Hill. Kogakushu 1976 Internations student edition 2. T.M Apostal Mathematical Analysis, Narosa publishing House New Delhi 1985, 3 Shanti Narain Real Analysis Chand & Co New Delhi. 4 Malik and Arora Mathematical Analysis	

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. I Semester

<table>
<tr><td>Course Title</td><td colspan="2">Topology</td></tr>
<tr><td>Type of Course</td><td colspan="2">Theory, Paper III</td></tr>
<tr><td>Course Assessment</td><td colspan="2">Sessional Tests 30%
Semester Examination 70%</td></tr>
<tr><td colspan="2">Contents of Syllabus</td><td>No of Questions</td></tr>
<tr><td colspan="2">UNIT I

Countable and uncountable sets Infinite Sets and the Axiom of Choice (statement only) Cardinal numbers Schroeder Bernstein theorem Cantor s theorem and continuum hypothesis . Zorn's lemma (statement only)</td><td>02</td></tr>
<tr><td colspan="2">UNIT II: Definition and examples of topological spaces closed sets, Closure. Dense subscts. Neighbourhoods Interior exterior and boundary. Accomulation points and derived sets Bases and sub base Subspaces and relative topologies.</td><td>02</td></tr>
<tr><td colspan="2">UNIT III: First and Second countable spaces Lindelof's theorem separable spaces, second countability and separability separation axioms To TI, T2 T3 T4 their Characterizations and basic properties. Urysohn' Lemma. Tietze extension theorem.</td><td>02</td></tr>
<tr><td colspan="2">UNIT IV

Compactness, continuous functions and compact sets. BasiC property of compactness Compactness and finite intersection property Tychonoffs Theorem connected and disconnected spaces and their basic properties,</td><td>02</td></tr>
<tr><td>Textbooks */ Reference Books</td><td colspan="2">1. K D Joshi : Introduction to General topology, Wiley eastern Ltd. 1963
2. J L Kelly – General Topology, Van Nostrand, Reinhold Co. New York, 1995.
3. W J Pervin- Foundation of general Topology, Academic Press Inc New York 1964.
4. K K Jha – Advance General Topology, Nav Bharat Prakashan Delhi
5. G F Simmons – Introduction to Topology and Modern Analysis, Mc Graw Hill.</td></tr>
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RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. I Semester

Course Title	**Complex Analysis**
Type of Course	**Theory, Paper IV**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I: Complex Integration, Cauchy Goursat's theorem, Cauchy's Integral formula, Higher Order Derivative, Morera;s Theorem, Cauchy's inequality, Liouville's theorem.	02
UNIT II The fundamental theorem of Algebra, Taylor's theorem, Maximum modulus principle, Schwarz Lemma, Laurent's series.	02
UNIT III Isolated singularities, Meromorphic function, the argument principle, Rouche's theorem, Poles and zeroes, fundamental theorem, residues, Cauchy Residue Theorem, Evaluation of integrals.	02
UNIT IV Bilinear transformation, their properties and classification , Definition and examples of conformal mapping. Analytic continuation uniqueness of direct analytic continuation , uniqueness of analytic continuation along a curve, Power series, method of analytic continuation.	02

Textbooks* /Reference Books	1.L V Ahifor – Complex Analysis, Mc Graw Hill, 1979 1. S Lang Complex Analysis, Addison Wesely 1977. 2. Walter Rudin, Real and Complex Analysis, Mc Graw Hill Co 1966. 3. E C Tichmarsh – The theory of functions, Oxford University Press, London. 4. S Ponnusamy – foundation of Complex analysis, Narosa Publishing House, 1997. 5. Shanti Narain – Complex variables

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

<table>
<tr><td>Course Title</td><td colspan="2">Basic Computer and Programming in ‘C’</td></tr>
<tr><td>Type of Course</td><td colspan="2">Theory, Paper V</td></tr>
<tr><td>Course Assessment</td><td colspan="2">Sessional Tests 30%
Semester Examination 70% [40% Theory, 30% Practical]</td></tr>
<tr><td colspan="2">Contents of Syllabus</td><td>No of Questions</td></tr>
<tr><td colspan="2">UNIT I:
INTRODUCTION TO COMPUTERS: Block Diagram of computer, Functioning of computer ,Generations of computer, Classification of compuers, Characteristics , Advantage and Limitations of Computers. Computer memory, Primary and Secondary , Types of Primary memory.</td><td>02</td></tr>
<tr><td colspan="2">UNIT II
Number system, Decimal , Binary, Octal, Hexadecimal, number system, features and convariance , binary arithmetic , ASCII and EBCDIC codes.
ALGORITHM AND FLOW CHART : Algorithm for problem solving , an introduction, properties of an algorithm, classification, algorithm logic , flow chart.</td><td>02</td></tr>
<tr><td colspan="2">UNIT III
C- programming : An overview of programming , programming language classification, History of C, Importance of C , basic structure of C, program, executing a C program, compiling and linking .
Scalar Data Type → Declaration, different types of integers, different kinds of Integer constant, Floating Point Types initialization mixing types enumeration types, the void data type, Tydefs, find the address of an object, pointers.</td><td>02</td></tr>
<tr><td colspan="2">UNIT IV
Operation and expressions, Operatus, Introduction, Orthometic operators, rational operators, logical operators, assignment operators, Increment and decrement operators, Bit wise operators. Arithmetic expressions, Evaluation of expresson, precedence of arithmetic operator.
Control flow, conditional branching, The Switch statement, Looping, Nested loops, the ‘ brake and continue’ statement. The Go to statement. Infinite loops, arrays and pointers, declaring an array, Arrays and memory. Initializing array. Multidimensional arrays.</td><td>02</td></tr>
<tr><td colspan="2"><u>PRACTICALS</u>
1. Programme of bisection method,
2. Programme of false poisson method,
3. Programme of Newton – Rapson’s method
4. Simpson’s $\frac{1}{3}$ rd rule.
5. Gauss’s Elimination method.
6. Gauss seidal method.
7. Numerical differentiation
8. Lagrange’s interpolation formulae.
9. Newton’s Interpolation Formula.
10. Euler’s method for first order ordinary differential equation</td><td></td></tr>
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RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Differential Equation and Special Functions**
Type of Course	**Theory, Paper VI**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Introduction to Generalized Hyper geometric function, Differential Equations satisfied by pFq. Saclchut 'Z' theorem, Whipples theorem, Dixon's theorem, Integrals involving generalized hyper geometric functions. Contiguous function relations, Kummer's theorem, ramanujan's theorem.	02
UNIT II Introduction to Hermite Polynomials, Recurrence Relation, Orthogonal properties, expansion of polynomials, Generating functions, Rodrigues formula for Hermite Polynomials.	02
UNIT III Inroduction to Laguerre's Polynomials, recurrence relations, generating functions , Rodrigue's formula and Orthogonality. Expamry special results, Laguerre's associated differential equations. More generating functions.	02
UNIT IV Introducion to Jacobi Polynomials , Generating functions, Rodrigue's formula and Orthogonality, Introduction of Elliptic function. Properties. Weierstrass ellipite, Jacobian theta function, Zeroes of Theta function.	02

Textbooks */ Reference Books	1. W T Reid – Ordinary Differential Equations, John Wiley & Sons NY (1971). 2. E A Coddington and Levinson – Theory of Ordinary Differential Equations, Mc Graw Hill NY (1955) 3. Sneddon I N (1961) – Special Functions of Mathematical Physics and Chemistry; Oliver and Boyd, Edinburg 4. Bell W W (1966) – Special functions for Scientific and Engineers, D Van Nontrand Conv. Ltd. London. 5. Rainville, E D (1960) Special Functions , Macmillan , New York.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Differential Geometry and Tensor Calculus**
Type of Course	**Theory, Paper VII**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Space curves-curvature and torsion. Serret- Frenet formula. Circular helix, the circle of curvature. Osculating sphere, Bertrand curves.	02
UNIT **II** Curves on a surface-parametric curves. fundamental magnitude, curvature of normal section. Principal directions and principal curvatures, lines of curvature, Rodrigues formula. Dupin's theorem, theorem of Euler, Conjugate directions and Asymptotic lines.	02
UNIT III One parameter family of surfaces Envelope the edge of regression, Developables associated with space curves. Geodesics-differential equation of Geodesic. Torsion of a Geodesic.	02
UNIT **IV** Tensors, Tensor Algebra, Quotient theorem. Metric Tensor, Angle between two vectors.	02

Textbooks */ Reference Books	References : 1. J. N. Sharma and A.R. Vasistha, Differential Geometry. 2. C.E. Weatherburn. Differential geometry of three dimensions. 3. P.P. Gupta & G.S.Malik. Three dimensional differential geometry. 4. C.E. Weatherburn. Tensor calculus. 5. R.S. Mishra, Tensor Calculus and Riemanian Geometry.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Analytical Dynamics and Gravitation**
Type of Course	**Theory, Paper VIII**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Generalized coordinates Holonomic and Non-holonomic systems. Scleronomic and Rheonomic systems. Generalized potential. Lagrange's equations of first kind. Lagrange's equations of second kind. Energy equation of conservative fields.	02
UNIT II Hamilton's variables, Hamilton canonical equations. Cyclic coordinates Routh's equations, Jacobi-Poisson Theorem. Fundamental lemma of calculus of variations. Motivating problems of calculus of variations. Shortest distance. Minimum surface of revolution. Brachstochrone problem, Geodesic.	02
UNIT III Hamilton's Principle, Principle of least action. Jacobi's equations. Hamilton-Jacobi equations. Jacobi theorem. Lagrange brackets and Poisson brackets. Invariance of Langrange brackets and Poisson brackets under canonical transformations.	02
UNIT IV Gravitation: Attraction and potential of rod, spherical shells and sphere. Laplace and Poisson equations. Work done by self attracting systems. Distributors for a given potential. Equipotential surfaces.	02

Textbooks */ Reference Books	References : • H. Goldstein, Classical Mechanics (2"d edition), Narosa Publishing House, New Delhi. • 1.M.Gelfand and S.V.Fomin Calculus of variation, prentice Hall. • S.L. Loney, An elementary treatise on Statics, Kalyani Publishers, N. Delhi 1979. • A.S.Ramsey, Newtonian Gravitation. The English Language Book Society and the Cambridge University Press. • N.C. Rana & P.S.Chandra Joag, Classical Mechanics. Tata McGraw Hill 1991. • Lours N. Hand and Jane!, D. Finch, Analytical Mechanics, Cambridge University Press, 199

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Difference Equations**
Type of Course	**Theory, Paper IX [A]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I The Calculus of finite differences: Introduction of finite difference — Differences. Differences formulae and problems. Fundamental theorem of difference calculus, properties of the operators A and E, Relation between operator E of finite differences and differential coefficient D of differential calculus. One or more missing terms method I and II, Factorial notation methods of representing any polynomial, Recurrence relations, Leibnitz rule, effect of an error in a tabular value.	02
UNIT II Difference equations : Introduction. definition of difference equation. solution of the difference equations. various type of linear difference equation. differential equation as limit of difference equations. Linearly independent functions. Homogenous difference equation with constant coefficients. Homogenous linear difference equations with variable coefficients. existence and uniqueness theorem. .	02
UNIT III Linear difference equation with constant coefficient, method of undetermined coefficient coefficient and special operator method to find particular solution, Solution of linear difference . equation with constant coefficient using Variation of parameter, calculation of nth power of a matrix A , matrix method for the solution of system of linear difference equation, generating function technique to solve linear difference equation, apllications of difference equations, cobweb phenomenon.	02
UNIT IV Numerical solution of partial differential equations : Boundary — value problem with boundary conditions. Laplace equations, wave equations. Heat equation.	02

Textbooks */ Reference Books	• Calvin Ahlbrandt and Allan C. Peterson. Discrete Hamiltonian Systems. Difference Equations. Continued Fractions and Riecati Equations. Kluwer. Boston 1996. • Kalman Busby and Ross, Discreate Mathematical structure,Pearsion education. S.Elaydi, Difference equation, springer.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Number Theory**	
Type of Course	**Theory, Paper IX [B]**	
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**	
Contents of Syllabus		**No of Questions**
UNIT I Divisibity theory : Gretest Common divisor, Least common multiple, linear diophantine equation, Fundamental theorem of arithmetic		02
UNIT II Congruences : Residue system, test of divisibility, linear congruencs, Chinese Remainder Theorem, polynomial congruences, application in solution of Diophantine equation, Fermat's Little theorem(FLT1), Eulers genaralization of FLT1, Wilson's theorem. .		02
UNIT III Arithmetic functions(*Eulers 0, cr and z),* definitions, examples and their properties, perfect numbers, the Mobius Inversion formula, properties of Mobius function, convolution of arithmetic functions, group properties of arithmetic functions, recurrence functions, Fibonacci numbers and their elementary properties.		02
UNIT IV Quadratic Residues, Quadratic Reciproctiy law, Euler's criterion, Legendre symbol and its properties, Gauss Lemma,Jacobi symbol and its properties. **Cryptography:** some simple cryptosystem, Enciphering matrices, Idea of public key cryptography.		02

Textbooks */ Reference Books	• Calvin Ahlbrandt and Allan C. Peterson. Discrete Hamiltonian Systems. Difference Equations. Continued Fractions and Riecati Equations. Kluwer. Boston 1996. • Kalman Busby and Ross, Discreate Mathematical structure,Pearsion education. S.Elaydi, Difference equation, springer.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. II Semester

Course Title	**Advanced Discrete Mathematics**	
Type of Course	**Theory, Paper IX [C]**	
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**	
Contents of Syllabus		**No of Questions**
UNIT I Languge and grammars, Finite state machines with output, Finite state machines with no output, Finite state Machine, Finite state automata, deterministic finite state automata(DFSA), non deterministic finite state automata(NDFSA), transition diagram.		02
UNIT II Equivalence of DFSA and NDFSA, Moor machine, Mealy machine and Turning machine, Languages and regular expressions,Language determined by finite state automaton, grammars. .		02
UNIT III Colouring : Vertex colouring, chromatic number, chromatic polynomial, Brooks theorem, edge colouring, chromatic index, map colouring, six colour theorem, Five colour theorem.		02
UNIT IV Hamiltonian graph,Ore's theorem, Dirac' theorem, The Shortest path problem, Dijkstra's algorithm. Hall's marriage, theorem, transvarsal theory, Alternative proof of Hall's theorem using transversal theory, applications of Hall's theorem.		02

Textbooks */ Reference Books	1. Graph Theory — R. J. Wilson. 2. Kalman Busby and Ross, Discreate mathematical structure, Pearsion education. 3. D. S. Malik and M. K. Sen : Discrete mathematical structures : theory and applications; Thomson; Australia; 2004. 4. Edward R. Scheinerman : Mathematics A Discrete Introduction; Thomson Asia Ltd.; Singapore; 2001. 5. Discrete mathematical structure, R.P.Grimaldi, Pearson education.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. III Semester

Course Title	**Functional Analysis**	
Type of Course	**Theory, Paper X**	
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**	
Contents of Syllabus		**No of Questions**
UNIT I Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness, equivalent norms.		02
UNIT II Bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.Hahn-Banach theorem Open mapping and closed graph theorem, the natural imbedding of N in N**. Reflexive spaces.		02
UNIT III Inner product spaces. Hilbert spaces. Orthonormal Sets. Bessel's inequality. Complete orthonormal sets and Parseval's identity. Projection theorem. Rietz representation theorem Adjoint of an operator on a Hilbert space.		02
UNIT IV Reflexivity of Hilbert spaces. Self-adjoint operators. Positive, normal and unitary operators. Linear transformation & linear functionals		02
Textbooks */ Reference Books	**References:** 1. G.F. Simmons,Topology and modern analysis TMH. 2 G. Bachman and L. Narici, Functional Analysis, Academic Press, 1966. 3 R.E. Edwards, Functional Analysis. Holt Rinehart and Winston, New York 1958. 4 C. Goffman and G. Pedrick. First Course in Functional Analysis, Prentice Hall of India, New Delhi. 1987. 5 E. Kreyszig, Functional analysis with application, John wiley and sons.	

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. III Semester

Course Title	**Partial Differential Equations**
Type of Course	**Theory, Paper XI**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Laplace equation — Fundamental solutions of two and three dimensional Laplace equation in Cartesian fonn. Properties of Harmonic functions. Boundary value problems.	02
UNIT H Heat equation — Derivation and fundamental solution of one dimensional Heat equation in Cartesian form. Application problems.	02
UNIT III Wave equation — Derivation and fundamental solution of one dimensional wave equation in Cartesian form. Application problems.	02
UNIT IV Solutions of p.d.e. using Separation of variables, Fourier transform and Laplace transform, Green's function and solutions of boundary value problems.	02

Textbooks */ Reference Books	**References :** I. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998. 2 I.N. Sneddon,Use of integrals transforms McGraw Hill. 3 P. Prasad and R. Ravindran ; Partial Differential equation. 4 K. Sankar Rio, Partial differential equation, new age.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. III Semester

Course Title	**Fluid Mechanics**
Type of Course	**Theory, Paper XII**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Kinematics — Lagrangian and Eulerian methods. Equation of continuity in different coordinate system. Boundary surfaces. Stream lines. Path lines and streak lines. Velocity potential, Irrotational and rotational motions. Vortex lines.	02
UNIT II: Equations of Motion — Lagrange 's and Euler's equations of motion. Bernoulli's theorem. Equation of motion by flux method. Impulsive actions. Stream function Irrotational motion. .	02
UNIT III: Complex velocity potential. Sources, sinks doublets and their images in two dimension. Conformal mapping. Milne-Thomson circle theorem.	02
UNIT IV: Two-dimensional Irrotational motion produced by motion of circular, co-axial and elliptic cylinders in an infinite mass of liquid. Theorem of Blasius. Motion of a sphere through a liquid at rest at infinity. Liquid streaming past a fixed sphere. Equation of motion of a sphere.	02

Textbooks */ Reference Books	1. W.H.Besaint & A. S. Ramsey. A Treatise on Hydro mechanics. Part II. CBS Publishers. Delhi. 1988. 2. G.K. Batchelor. An Introduction of Fluid Mechanics. Foundation Books. New Delhi. 1994. 3. F. Choriton. Textbook of Fluid Dynamics. C.B.S. Publishers. Delhi 1985. 4. Fluid mechanics — Bansal. 5. Fluid dynamics, M.D. Raisinghania, S.Chand Publication.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Fuzzy Sets And Their Applications**
Type of Course	**Theory, Paper XIII [A]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Definitions — level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products. Algebraic products. Bounded sum and difference. T-norms and t-conorms. The Extension Principle — The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.	02
UNIT II Fuzzy Relations and Fuzzy Graphs — Fuzzy relations on fuzzy sets. Composition of fuzzy relations. Fuzzy relation equations. Fuzzy graph. Similarity relation	02
UNIT III Possibility Theory — Fuzzy measures. Evidence theory. Necessity measure. Possibility measure. Possibility distribution. Possibility theory and fuzzy sets. Possibility theory versus probability theo Fuzzy Logic — An overview of classical logic. Multivalued logics. Fuzzy propositions. Fuzzy quantifiers. Linguistic variables and hedges. Inference from conditional fuzzy propositions. the compositional rule of inference.	02
UNIT IV An Introduction to Fuzzy Control-Fuzzy controllers. Fuzzy rule base. Fuzzy inference engine. Fuzzification. Defuzzification and the various defuzzification methods (the center of area. the center of maxima. and the mean of maxima methods). Decision making in Fuzzy Environment-Individual decision making. Multiperson decision making. Multicriteria decision making. Multistage decision making. Fuzzy ranking methods. Fuzzy linear programming.	02

Textbooks */ Reference Books	• H.J. Zimmermann : Fazzy set theory and its Applications. Allied Publishers Ltd. New Delhi. 1991.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Algebraic Topology**
Type of Course	**Theory, Paper XIII [B]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus

UNIT I Fundamental group functo. homotopy of maps between topological spaces. homotopy equivalence. contractible and simply connected spaces. fundamental groups of S and S^i x S^i etc. Calculation of fundamental group of S. N>1 using Van Kampen's theorem. fundamental groups of a topological group. Brouwer's fixed point theorem. fundamental theorem of algebra. vector fields on planner sets. Frobenius theorem for 3 x 3 matrices.	02
UNIT II Covering spaces. unique path lifting theorem. covering homotopy theorems. group of covering transformations. criteria of lifting of maps in terms of fundamental groups. universal covering. its existence. special cases of manifolds and topological groups. Singular homology, reduced homology. Eilenberg Steenrod axioms of homology (no proof for homotopy invariance axiom decision axiom and exact segnence axiom) and theory application. relation between fundamental group and first homology.	02
UNIT III Calculation of homology of S. Brouwer's fixed point theorem for f : E^n -> **E.** application spheres. vector fields. Mayer-Vietoris sequence (without proof) & its applications. Singular cohomology modules. Kronecker product. connecting homomorphism. contra-functoriality of singular cohomology modules. naturality of connecting homomorphism. exact cohomology sequence of pair. homotopy invariance. excision properties. cohomology of a point. Mayer vietoris sequence and its application in computation of cohomology of S^n. RP". CP$^{I'}$ torus. compact surface of genus g and non-orientable compact surface.	02
UNIT IV Compact connected 2-manifolds. their orientabiligy and non-orientabiligy. examples. connected sum. construction of projective space and Klein's bottle from a square. Klien's bottle as union of two Mobius strips. canonical of sphere. torus and projective plannes. Klin's bottle as union of two Mobius strips. triangulation of compact surfaces. Classification theorem for compact surfaces. connected sum of tours and projective plans as the connected sum of three projective planes. Euler characteristic as a topological invariant of compact surfaces. connected sum formula. 2-manofolds with boundary and their classifications. Euler characteristic of a bordered surface, models of compact bordered surfaces in R^3.	02

Textbooks */ Reference Books	References : • James R. Munkres. Topology — A first Course. Prentice Hall of India Pvt. Ltd., New Delhi, 1978.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Mechanics of Solids**
Type of Course	**Theory, Paper XIV [A]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Analysis off Strain-Affine transformation. Infinite simal affine deformation. Geometrical interpretation of the components of stain. Strain quadric of Cauchy. Principal strains and invariants. General infinite simal deformation. Saint-Venant's equations of Compatibility. Finite deformations.	02
UNIT II Analysis of Stress-Stress tensor. Equations of equilibrium. Transformation of coordinates. Stress qudric of Cauchy. Principal stress and invariants. Maximum normal and shear stresses.	02
UNIT III Equations of Elasticity. Generalized Hooke's law. Homogeneous isotropic media. Elasticity moduli for isotropic media. Elasticity moduli for isotropic media. Equilibrium and dynamic equations for an isotropic elastic solid. Strain energy function and its connection with Hooke's law. Uniqueness of solution Beltrami-Michell compatibility equations. Saint-Venant's principle. Torsion-Torsion of cylindrical bars. Tortional rigidity. Torsion and stress functions. Lines of shearing stress. Simple problems — Plane stress. Generalized plane stress. Airy stress function. General solution of Biharmonic equation. Stresses and displacements in terms of complex potentials. Simple problems. Stress function appropriate to problems of plane stress problems of semi-infinite solids with displacements or stresses prescribed on the plane boundary.	02
UNIT IV Waves-Propagation of waves in an isotropic elastic solid medium. Waves of dilation and distortion. Plane waves. Elastic surface waves such as Rayleigh and Love waves. Variational methods — Theorems of minimum potential energy. Theorem of minimum complementary energy. Reciprocal theorem of Betti and Rayleigh. Deflection of elastic string central line of a beam and elastic membrane. Torsion of cylinders. Variational problem related to biharmonic equation. Solution of Euler's equation by Ritz. Galerkin and Kantorovich methods.	02

Textbooks */ Reference Books	**References :** • **I.S.** Sokolnikoff, Mathematical Theory of Elasticity. Tata McGraw-Hill Publishing Company Ltd., New Delhi. 1977. • A. E. Love. A Treatise on the Mathematical Theory of Elasticity. Cambridge University Press. London. 1963. • Y.C. Fung Foundations of Solid Mechanics. Prentice Hall, New Delhi. 1965. 1. S. Timoshenko and N. Goodier. Theory of Elasticity, McGraw Hill, New York 1970

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Operations Research**
Type of Course	**Theory, Paper XIV [B]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I **Sequencing:** Introduction, sequencing problem with n-jobs and two machines. optimal sequencing problems with n-jobs and three machine. Problems with n-jobs and m-machine, graphical solution.	02
UNIT II **Replacement Problems :** Introduction, replacement of item that Deteriorate with time, Replacement of items whose maintenance costs change with time and the value of money remains same during the period. replacement of items whose maintenance costs increase with time and the value of money also changes with time. replacement of items that fail completely, individual replacement policy, group replacement policy. **Queuing theory :** Introduction, characteristics of queuing system, queue discipline, symbols etc. Poisson process and exponential distribution, properties of Poisson process, classification of queues. definition of transient and steady state, model (M/M/L) (Din Fo), (M/M/I) (SIRO) (M/M/I) (MFIFO).	02
UNIT III **Non-Linear programming** — Introduction, definitions of general non-linear programming problems, problems of constrained maxima and minima; necessary and sufficient conditions for non-linear programming problems, Hessian — matrix, Lagrangian functions with Lagrangian multiplier. constraints are not all equality constraints. sufficiency of saddle point problem. Kuhn-Tucker condition.	02
UNIT IV Non-linear programming techniques — Introduction of GMPP & GN 1 PP its sanction by Wolfe's method. Beale's method.	02

Textbooks */ Reference Books	**References :** 1. F.S. Hillier and G. **J.** Lieberman. Introduction to Operations Research (Sixth Edition). McGraw Hill International Edition. Industrial Engineering Series. 1995 (This book comes with a CD containing tutorial software). 2. G. Hadley, Linear Programming. Narosa Publishing House. 1995. 3. G. Haadly. Nonlinear and Dynamic Programming. Addisor-Wisely. Reading Mass. 4. Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi. 5. S. S. Rao. Optimization Theory and Applications. Wiley Eastern Ltd., New Delhi.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Differentiable Structures On A Manifold**
Type of Course	**Theory, Paper XIV [C]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Almost Hermite manifolds. Riem Almost analytic vector .fields. Curvature tensor. Linear connections. Kahler manifolds. Affine Connections. Holomorphic sectional curvature. Curvature tensor. Almost Analytic Vector fields	02
UNIT II Nearly Kahler manifolds. Curvature identities. Constant Holomorphic sectional curvature. Almost analytic Vector Fields.	02
UNIT III Almost Kahler manifolds. Analytic vector fields. Conformal transformation. Curvature identities, Almost Contact Metric manifolds — Almost Grayan manifolds. K-Contact Riemannian manifolds. Sasakian manifolds. Cosymplectic manifolds.	02
UNIT IV Subamanifolds of almost Hermite and Kahler manifolds. Sub-manifolds of almost contact metric manifolds. CR-Submanifolds of Kahler manifolds and Sasakian manifolds. The integrability of distributions.	02

Textbooks */ Reference Books	**References :** R.S. Mishra. Structures on a differentiable manifold and their applications. Chadrama Prakashan. Allahabad, 1984.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Information Theory**
Type of Course	**Theory, Paper XIV [D]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Measures of information. Axioms for a measure of uncertainty. The Shannon entropy and its properties. Joint and conditional entropies. Transformation and its properties. Noiseless coding — ingredients of noiseless coding problem. Uniquely decipherable codes. Necessary and sufficient condition for the existence of instantaneous codes. Construction of optimal codes.	02
UNIT II Discrete memory less channel. Classification of channels. Information processed by a channel. Calculation of channel capacity. Decoding schemes. The ideal observer. The fundamental theorem of Information theory and its strong and weak converses	02
UNIT III Continuous channels — The time- discrete Gaussian channel. Uncertainty of an absolutely continuous random variable. The converse to the coding theorem for time-discrete Gaussian channel. The time-continuous Gaussian channel. Band-limited channels.	02
UNIT IV Information functions, the fundamental equation of information, information functions continuous at the origin, nonnegative bounded information functions, measurable information functions and entropy. Axiomatic characterizations of the Shannon entropy due to Tverberg and Leo. The general solution of the fundamental equation of information. Derivations and their role in the study of information functions. The branching property. Some characterizations of the Shannon entropy based upon the branching property. Entropies with the sum property. The Shannon inequality. Sub additive. additive entropies.	02

Textbooks/ Reference Books	**References :** 1. R. Ash. Information Theory, Inter science Publishers. New York 1965. 2. F.M.Reza. An introduction to information Theory. Mc Graw-Hill Book Company inc. 1961. 3. J. Aczel and Z. Daroczy. On measures of information and their characterizations. Academic press. New York

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Integral Transforms**
Type of Course	**Theory, Paper XV [A]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Fundamental Formulae-The Laplace Transform-Definition Region of convergence. abscissa of convergence, absolute convergence, Uniform convergence of Laplace Transform. Complex Inversion formula. The Stieltje transform-Elementary properties of the transform. Relation to the Laplace transform. Complex Inversion formulae.	02
UNIT II The Fourier transform :Difichlet's conditions. Definition of Fourier transform. Fourier Sine Transform, Fourier cosine transform. Inversion theorem for complex fourier transform. Difinition of convolution and convolution theorem for Fourier transforms. Parseval's identity of Fourier transforms.	02
UNIT III The Mellintrans form : Definition of Mellin transform and its properties. Mellin transforms of derivatives and certain integral expressions.	02
UNIT IV Hankel Transform : Definition of Hankel transform and its elementary properties. Inversion formula for the Hankel transform. Hankel transform of derivatives, Parseval's theorem.	02

Textbooks */ Reference Books	1. The Laplace Transforms - D.V.Widder 2. Use of Integral Transforms Sneddon

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Algebraic Coding Theory**
Type of Course	**Theory, Paper XV [B]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Coding theory, Introduction, examples, Impotant code parameters, Correcting and detecting errors, Sphere-packing bound, Gilbert-Varshamov bound, Sigleton bound.	02
UNIT II Linear codes: Vector spaces over finite fields,Linearcodes,Binary linear , Hamming weight, Bases of linear codes, Generator matrix and parity check matrix	02
UNIT III Equivalence of linear codes, Encoding with a linear code,Decoding of linear codes, Cosets, Nearest neighbour decoding for linear codes, Syndrom decoding.	02
UNIT IV Cyclic codes: Definitions, Generator and parity check polynomials, Generator and parity check, matrices, Decoding of cyclic codes, Burst-error-correcting codes. Reed-Solomon codes. Some special cyclic codes: BCH codes, RS codes, Defintions, Parameters of BCH codes,Decoding of BCH codes.Reed-Muller Codes.Maximum-distance Separable (MDS) Codes. Generator and Parity-check matrics.of MDS Code. Weight Distribution of MDS Code. MDS codes from RS codes. Codes derived from Hadamard Matrices.	02

Textbooks */ Reference Books	1. R.Hill, Afirst course in codding theory, oxford university press 2. F.Macwwilliams and N.Sloane, The Theory of error correcting codes, North Holland Publishing company, Amsterdom. 3. San Ling and Chaoingxing, Coding Theory- A First Course. 4. Applied Abstract Algebra - Lid and Pilz 2nd Edition. 5. Todd K. Moon, Error Correction Coding, Wiley India

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Mathematic of Finance and Insurance**
Type of Course	**Theory, Paper XV [C]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus	**No of Questions**
UNIT I Prerequisite — Application of Mathematics and Finance & Insurance Optional Paper BMG 1 304 (a & b) F) Financial Derivatives — An Introduction : Types of Financial Derivatives — Forwards and Futures : Options and its kind : and SWAPS. The Arbitrage Theorem and Introduction to portfolio Selection and Capital Market Theory — Static and Continuous — Time Model.	02
UNIT II Pricing by Arbitrage — A Single — Period Option Pricing Model: Multi Pricing Model-Cox-Ross-Rubinstein Model : Bounds on Option Prices. The Dynamics of Derivative Prices-Stochastic Differential Equations (SDEs) — Major Models of SDEs. Lonear Constant Coefficient SDEs: Geometric SDEs : Square Root Process: Mean Reverting Process and Omstein-Uhlenbeck Process. Martingale Measue and Risk-Neutral Probabilities : Pricing of Binomial Options with equivalent martingale measures.	02
UNIT III The Black-Scholes Option Pricing Model- Using no arbitrage approach, limiting case of Binomial Option Pricing and Risk-Neutral probabilities.The American Option Pricing-Extended Trading Strategies; Analysis of American Put Options: early exercise premium and relation to free boundary problems. Concepts from Insurance : Introduction : The Claim Number Process : The Claim Size Process: Solvability of the Portfolio: Reinsurance and Ruin Problem. Premiumand Ordering of Risks-Premium Calculation Principles and Ordering Distributions.	02
UNIT IV Distributions of Aggregate Claim Amount-Individual and Collective Model: Compound Distributions : Claim Number of Distributions: Recursive Computation Methods: Lundberg Bounds and Approximation by Compound Distributions. Risk Processes-Time-Dependent Risk Models: Poisson Arrival Processes : Ruin Probabilities and Bounds Asymptotic and Approximation.Time Dependent Risk Models — Ruin Problems and Computations of Ruin Functions; Dual Queuing Model : Risk Models in Continuous Time and Numerical Evaluation of Ruin Functions.	02

Textbooks */ Reference Books	• John C. Hull, Options. Futures and other derivatives. Prentice Hall of India Pvt. Ltd. • Sheldon M. Ross. An Introduction to Mathematical Finance. Cambridge University Press.

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Applied Statistics**	
Type of Course	**Theory, Paper XV [D]**	
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**	
Contents of Syllabus		**No of Questions**
UNIT I Demand analysis. price elasticity and demand. partial elasticity of demand. Lontieg's method. Pigou's method. Engle's curve and Engle's law. Paretv's law of income distribution, curves of concentration.		02
UNIT II Analysis of Variance. One way classification, statistical analysis of the mode.Design experiment-statistical analysis of C.R.D. (Completely randomized design) least square estimates of effects. exception of sum of squares. randomized block design (R.B.D.)_ statistical analysis of R.B.D. for one observation per experiment unit. Variance of estimates. expectation of sum of squares. efficiency of R.B.D. relative to C.R.D.		02
UNIT III Design of sample survey. Principle steps in a sample survey sampling and non-sampling error. types of sampling. selection of a simple random sample, simple random sampling, stratified random sampling. Psychological and educational statistics — scaling of scores on a test. percentile scores, scaling of rankings, scaling of normal probability curves. scaling of ratings in terms of normal curve, reliability of test scars, error variance, index of reliability, parallel test method of determining test reliability. .		02
UNIT IV Vital Statistics_ uses of vital statistics, methods of obtaining vital statistics, measurement of population , measurement of mortality, crude death rate (C.D.R.) specific death rate (SDR). specific rate, life table or (Mortality table). abridged life table, fertility measurement of population growth.		02
Textbooks */ Reference Books	• Fundamental of Applied Statistics — S.C.Gupta& V. K. Kappor • Statistical Method — S.P. Gupta • An Introduction to statistical method — S.B.Gupta	

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Boundary Layer Theory**
Type of Course	**Theory, Paper XV [E]**
Course Assessment	**Sessional Tests 30%** **Semester Examination 70%**

Contents of Syllabus

UNIT I Exact solution of Navier-Stoke's equation — flow between two concentric rotating cylinders. Hiemenz flow. flow due to lane wall suddenly set in motion, flow due to an oscillating wall.	02
UNIT II Theory of very slow motion — flow past a sphere. (Stroke's flow). Flow past a sphere (Osceen'sflow), Lubrication Theory. Theory of laminar boundary layer (a) two dimensional boundary layer equation for flow over a plane wall, boundary layer on a flat plate. (Blassius-Topler solution).	02
UNIT III Characteristic of boundary layer parameters. (b) Similar solution of the boundary layer equation. boundary layer. How past a wedge boundary layer along the wall of a convergent channel. boundary layer on a symmetrically placed cylinder and body of evolution. .	02
UNIT IV Boundary layer control in laminar flow — methods of boundary layer control in laminar flow, boundary layer suction.	02

Textbooks */ Reference Books	• Boundary layer theory —Slicsting. • Foundation of fluid dynamics S.W. Yuan, Prentice Hall of India (F)

RADHA GOVIND UNIVERSITY, RAMGARH
DEPARTMENT OF MATHEMATICS
Syllabus of M.A./M.Sc. IV Semester

Course Title	**Dissertation**
Type of Course	**PROJECT, PAPER XVI**
Course Assessment	**100%**
Contents of Syllabus	
Any one of the Special Paper	