DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM & MARKING SCHEME

M.Sc. MATHEMATICS

Semester - III

SESSION : 2024-25

ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A+, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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DEPARTMENT OF MATHEMATICS

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG (C.G.)

Approved syllabus for M.Sc. Mathematics by the members of Board of Studies for the

Sessions 2024 - 25

The Syllabus with the paper combinations is as under

Semester III

I: MMT 301 - Integration Theory and Functional Analysis (I)	II: MMT 302 - Partial Differential Equations
III: MMT 302 - Programming in C(with ANSI features)(I)	IV: MMT 304(A) - Operations Research (I) MMT 304(B) - Fundamentals of Computer Science (Object Oriented Programming & Data Structure)
V: MMT 305(A) - Fuzzy Sets and Their Applications (I) MMT 305(B) - Graph Theory (I)	Lab Course/Practical: (A) Programming in C (B) Fundamentals of Computer Science

The Syllabus for M.Sc. Mathematics is hereby approved for the sessions 2024 -25.

Name and Signatures:

Chairperson / H.O.D - Dr. Padmavati 6/7/24 Subject Expert - Dr. Madhu Shrivastava 6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt **Representative Members** 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	**Faculty members:** Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh –

GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. Internal Assessment Examination will be as follows :
   i. Internal Test in each paper (20 marks)
   ii. Seminar (Power point presentation) in any one of the paper (20 marks)
   iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
   iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

5. There shall be one seminar in each semester. In each semester, the paper in which seminar has to be presented will be allotted randomly .The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion 10 marks. In seminar the marks taken in to consideration will be the average marks given by two examiners.

Chairperson / H.O.D - Dr. Padmavati 6/7/24 Subject Expert - Dr. Madhu Shrivastava 6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt **Representative Members** 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	**Faculty members:** Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh –

DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination has been revised from the Session 2018-19. The revised format will be applicable for all the question papers of Semester I, II, III & IV. The following are the main points of the new format:

1. The question paper will be of **80 marks** (as before)
2. Questions will be asked Unit-wise in each question paper.
3. From each Unit, the questions will be asked as follows :

Very short answer type question **(Answer in one or two sentences)**	**(02 Marks)**
Very short answer type question **(Answer in one or two sentences)**	**(02 Marks)**
Short answer type question	**(04 Marks)**
Long answer type questions	**(12 Marks)**

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
Short (1 Question)	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
Long answer (1 Question)	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.

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Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus / syllabi.

4. The students are required to study the content mentioned in the curriculum exhaustively.

CREDIT ALLOTMENTS

Theory 80 marks = 04 Credits

Internal Assessment 20 marks = 01 credit

Theory Paper + Practical = 05 credits (04+01)

Chairperson / H.O.D - Dr. Padmavati 6/7/24 Subject Expert - Dr. Madhu Shrivastava 6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt **Representative Members** 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	**Faculty members:** Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh –

Syllabus and Marking Scheme for M. Sc. Mathematics Third Semester Session 2024-25

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I	Integration theory and Functional analysis	80	16	20	04	05
II	Partial Differential Equations	80	16	20	04	05
III	Programming in C(with ANSI features) (I)	80	16	20	04	05
IV	Operations Research (I)	80	16	20	04	05
V	Fuzzy Sets and Their Applications (I)	80	16	20	04	05
IV	Practical in Paper III	50	18			02
	Total	450		100		27

05 Theory papers – 400 ; 01 Practical – 50 ; 05 Internal Assessments - 100
Total Marks - 550

Note: 20 marks = 01 credit in Theory Papers and 25 Marks = 01 Credit in Practical.

Chairperson / H.O.D - Dr. Padmavati

Subject Expert - Dr. Madhu Shrivastava

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

1. Dr. Anil Kashyap -
2. Shri A. K. Pandey -
3. Dr. Mayur Puri Goswami

Faculty members:

Dr. M.A. Siddiqui –

Dr. Rakesh Tiwari –

Dr. (Smt.) Prachi Singh –

PG Department of Mathematics

Program Outcomes:

PO No.	Program outcomes upon completion of the M. Sc. Degree program, the student will be able to
PO No. - 1	Pursue higher studies in mathematics in reputed institute of our country and clear Competitive exams like SET / NET / TET etc.
PO No. – 2	Read and identify mathematical and computational methods in order to solve comprehensive problems in several competitive examinations.
PO No. – 3	Well prepared to take jobs in schools and colleges as Mathematic Teachers and Professors, Software Industries, Research and Development Organizations.
PO No.- 4	Learn and apply Mathematics in real life situations aiming at service to the society.

Program Specific Outcomes:

PSO No.	Program specific outcomes : upon completion of the M. Sc. Degree program, the student will be able to
PSO - 1	Understand the fundamental axioms in mathematics and capable to develop ideas based on them.
PSO – 2	Inculcate mathematical reasoning and develop own learning capacity.
PSO – 3	Explain the core ideas and the techniques of mathematics and developabstract mathematical thinking.
PSO - 4	Assimilate the logical approach to take decision in complicated situations.
PSO - 5	Prepare and motivate for research studies in mathematics and relatedfields.

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Learning Outcomes:

Student able to learn various types of spaces, week and strong convergence and contraction mapping which are very powerful tools of research in fixed point theory.

Course Title	M. Sc. Final, Integration Theory & Functional Analysis
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Remember Sign measures and various theorems on measures, Riesz representation theorem, Fubinious Theorem.
CO No. – 2	Understand Nonlinear space and their completeness, Finite dimension norm linear space and compactness.
CO No.- 3	Analyze Nonlinear operators, convex functions, epi-graphs, Coercive mapping etc.
CO No.- 4	Apply uniform boundedness theorem, Open and closed graph theorem and Hahn Banach theorem, Reflexibility of Hilbert space, Self adjoint, Normal, Unitary operators..

Learning Outcomes:

Upon completion of this course student should be able to learn various types of partial differential equations in different fields.

Course Title	M. Sc. Final, Partial Differential Equations
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Understand Laplace equations, Heat equations, wave equations, solution by spherical means.
CO No. – 2	Analyze Geometric optics, Stationary phase and Homogenization.
CO No.- 3	Apply the modeling assumptions and derivations that leads to PDEs.

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Learning outcomes :

Students able to understand specially natural events, forces, gravitational and attraction forces to bodies .

Course Title	M. Sc. Final, Mechanics
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Remember Generalized coordinates Langranges equation of first kind in cyclic coordinates.
CO No. – 2	Understand Poisson's bracket Hamilton's principle, principle of least action Poincare Cardan integral invariant.
CO No.- 3	Analyze Whittaker equations Hamillton Jacobi equation invariation of lagrange bracket under canonical transformation.
CO No - 4	Evaluate the attraction for different types of objects.

Learning outcomes :

Application of computers using 'C'- Language and different fields of mathematical problem.

Course Title	M. Sc. Final, Programming in "C" (with ANSI features)
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Understand over view of programming, Anatomy of C-functions, variables and constants.
CO No. – 2	Create Different types of data.
CO No.- 3	Remember the main function Complex declaration, Conditional Compilation, Line Control etc.
CO No - 4	Analyze Input and output streams, Buffering, closing and opening files. The slandered library for input \output, Control flow conditional branching various types of loop..

Learning outcomes:

Application of Marketing field using this (Operation Research) and different fields of mathematical problems.

Course Title	M. Sc. Final, Operations Research
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Understand the scope of operation research.
CO No. – 2	Evaluate real world problems to linear programming problems. Solve this problem with various methods, Get acquired with various algorithm and techniques of above used methods.
CO No.- 3	Create mathematical formulation and solution of assignment problems and transportation problems, network analysis and methods to solve it.
CO No - 4	Apply the use of dynamic programming in various fields, Game theory, theory of queveing system and Inventory control to particle problems.

Learning outcomes:

After the study of this paper, students are familiar with the new branch of which is nearer to the real world.

Course Title	M. Sc. Final, (A) Fuzzy Sets and their Logics
CO No.	Course Outcomes This course will enable the student to :
CO No. – 1	Apply mathematical logic with real life. In this unit some models are explained.
CO No. – 2	Create an expert system, this unit gives basic propositional rules.
CO No.- 3	Remember the application of fuzzy set theory in the topic decision making, which is somewhat vague in nature?
CO No - 4	Understand operation between fuzzy sets and fuzzy numbers, difference between probability and possibility theory is explained through fuzzy sets.

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Learning outcomes:

After the study of this paper, students are familiar with the new branch of which is nearer to the real world as well as graphics.

Course Title	M. Sc. Final, (B) Graph Theory
CO No.	**Course Outcomes This course will enable the student to :**
CO No. – 1	Understand mathematical logic with real life. In this unit some models are explained.
CO No. – 2	Create Polynomials and Graph Enumeration: The colour polynomials, The chromatic polynomial, bivariate coloring polynomials.
CO No.- 3	Remember the concept of Perfectness-preserving operations, Forbidden Subgraph orientations, Ramsey numbers and Ramsey graphs.
CO No - 4	Understand the spectrum, Spectrum properties, Coloring packing and covering i. e. colorable graphs, edge-colorings, Face colorings..

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M. Sc. Mathematics (Third Semester)
2024 – 2025

PAPER –I
Code- MMT 301
Integration Theory and Functional Analysis (I)

Integration Theory
Max Marks. 80

Unit-I Signed measure. Hahn decomposition theorem. mutually singular measures. Radon-Nikodym theorem. Lebesgue decomposition. Riesz representation theorem. Extensiontheorem (Caratheodory). Product measures. Fubini's theorem.

Functional Analysis

Unit-II Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness. equivalent norms. Riesz Lemma. basic properties of finite dimensional normed linear spaces and compactness.

Unit-III Weak convergence and bounded linear transformations, normed linear spaces bounded linear transformations, dual spaces with examples.

Unit-IV Contraction mapping theorem and its application. Banach fixed point theorem. Picard'stheorem. Banach fixed point theorem as a source of existence and uniqueness theoremfor integral equations. Nonlinear operator, examples convex function, epigraph, monotone mapping, α-monotone, coercive mapping duality maps.

Recommended Books:

1. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.

2. B.Choudhary and Sudarsan Nanda, Functional Analysis with Applications Wiley Eastern Ltd., 1989.

References:

1. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962
2. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950. T.G. Hawkins, Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York,1979.
3. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962
4. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.

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5. T.G. Hawkins, Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
6. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
7. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
8. Inder K. Rana, An Introduction to Measure and Integration, Narosa Publishing House, Delhi, 1997.
9. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing.
10. Edwin Hewitt and Korl Stromberg, Real and Abstract Analysis, Springer-Verlag, New York.
11. Edwin Hewitt and Kenneth A. Ross, Abstract Harmonic Analysis, Vol. 1, Springer-Verlag, 1993.
12. G. Bachman and L. Narici, Functional Analysis, Academic Press, 1966.
13. N. Dunford and J.T. Schwartz, Linear Operators, Part I, Interscience, New York, 1958.
14. R.E. Edwards, Functional Analysis, Holt Rinehart and Winston, New York, 1965.
15. C. Goffman and G. Pedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
16. P.K. Jain, O.P. Ahuja and Khalil Ahmad, Functional Analysis, New Age International (P) Ltd. & Wiley Eastern Ltd., New Delhi, 1997.
17. R.B. Holmes, Geometric Functional Analysis and its Applications, Springer-Verlag, 1975.
18. K.K. Jha, Functional Analysis, Students' Friends, 1986.
19. L.V. Kantorovich and G.P. Akilov, Functional Analysis, Pergamon Press, 1982.
20. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
21. B.K. Lahiri, Elements of Functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.

Chairperson / H.O.D - Dr. Padmavati	**Faculty members:**
Subject Expert - Dr. Madhu Shrivastava	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	
Subject Expert - Dr. S. K. Bhatt	Dr. Rakesh Tiwari –
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M. Sc. Mathematics (Third Semester)
2024 – 2025

PAPER –II
Code- MMT 302
Partial Differential Equations

Unit-I Examples of PDE. Classification.Transport Equation - Initial value Problem. Non-homogeneous equation. Laplace's Equation - Fundamental Solution. Mean Value Formulas. Properties of Harmonic Functions. Green's Function. Energy Methods. Heat Equation - Fundamental Solution. Mean Value Formula. Properties of Solutions. Energy Methods. Wave Equation - Solution by Spherical Means. Non-homogeneous Equations. Energy Methods.

Unit-II Nonlinear First Order PDE-Complete Integrals. Envelopes, Characteristics. Hamilton Jacobi Equations (Calculus of Variations. Hamilton's ODE. Legendre Transform. Hopf-Lax Formula. Weak Solutions. Uniqueness). Conservation Laws (Shocks. Entropy Condtion. LaxOleinik formula. Weak Solutions. Uniqueness. Riemann's Problem. Long Time Behaviour)

Unit-III Representation of Solutions - Separation of Variables. Similarity Solutions (Plane and Travelling Waves. Solitons. Similarity under Scaling). Fourier and Laplace Transform. Hopf-Cole Transform. Hodograph and Legendre Transforms. Potential Functions.

Unit-IV Asymptotic (Singular Perturbations. Laplace's Method. Geometric Optics. Stationary Phase. Homogenization). Power Series (Non-characteristic Surfaces. Real Analytic Functions. Cauchy-Kovalevskaya Theorem).

References:

1. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998.
2. Books with the above title by I. N. Sneddon, F. John, P. Prasad and R. Ravindran, Amarnath etc.

Chairperson / H.O.D - Dr. Padmavati 6/7/24	**Faculty members:**
Subject Expert - Dr. Madhu Shrivastava Mshrivastava/6-07-24	Dr. M.A. Siddiqui –
Subject Expert - Dr. Shabnam Khan	Dr. Rakesh Tiwari –
Subject Expert - Dr. S. K. Bhatt	Dr. (Smt.) Prachi Singh –
Representative Members 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	

M. Sc. Mathematics (Third Semester)
2024 – 2025
PAPER –III
Code- MMT 303
Programming in C (with ANSI features) Theory and Practical

Max. Marks. 80
(Theory-50 +Practical-30)

Unit-I
An overview of programming. Programming language. Classification. C Essentials Program Development. Functions. Anatomy of a C Function. Variables and Constants. Expressions Assignment Statements. Formatting Source Files. ContinuationCharacter. The Preprocessor.

Unit-II
Scalar Data Types-Declarations. Different Types of Integers. Different kinds of Integer Constants. Floating-Point Types. Initialization. Mixing Types. Explicit Conversions- Casts. Enumeration Types. The Void Data Type. Typedefs. Finding the Address of an object. Pointers.

Unit-III
Control Flow-Conditional Branching. The Switch Statement. Looping. Nested Loops. The break and continue Statements. The goto statement. Infinite Loops. Operators and Expressions-Precedence and Associability. Unary Plus and Minus operators. Binary Arithmetic Operators. Arithmetic Assignment Operators. Increment and Decrement Operators. Comma Operator. Relational Operators. Logical Operators. Bit - Manipulation Operators. Bitwise Assignment Operators. Cast Operator. Size of Operators. Conditional Operator. Memory Operators.

Unit-IV
Arrays -Declaring an Array. Arrays and Memory. Initializing Arrays. Encryption and Decryption.

References:

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C : A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brian W. Kernighan & Dennis M. Ritohie, The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.

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4. Yashwant Kanetkar, Let Us C, 8th Edison, B P B Publications 2007.
5. E. Balagurusamy, Programming in C (ANSI), 4th Edison, Tata Mac Graw Hill.

List of C programmings for 3rd sem Mathematics

1. WAP for create a mark sheet and providing them grade.
2. WAP to sum of first n numbers.
3. WAP for calculating average and standard deviation.
4. WAP to check the number is palindrome or not.
5. WAP to find roots of quadratic equation.
6. WAP to check the given number is Armstrong number or not.
7. WAP to find Fibonacci series.
8. WAP for finding LCM of given number.
9. WAP using switch statement to convert a number into corresponding days.
10. WAP for finding sum of series (Cos, Sin, Tan)
11. WAP to construct pyramid of *.
12. WAP to sum of array for any 10 elements.
13. WAP to sort a string in alphabetic order.
14. WAP to remove or delete vowels from a string.
15. WAP to add one string after another string.

Chairperson / H.O.D - Dr. Padmavati 6/7/24 Subject Expert - Dr. Madhu Shrivastava 6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt **Representative Members** 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	**Faculty members:** Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh –

M. Sc. Mathematics (Third Semester)
2024 – 2025

PAPER –IV
Code- MMT 304

Operations Research (I)

Max .Marks. 80

Unit-I Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-graphical method of solutions, Simplex Method. Theory of the Simplex Method. Two phase method. Big M method of solution to an LPP.

Unit-II Duality in linear programming. Duality theorems, Dual Simplex method. Other Algorithms for Linear Programming-Dual Simplex Method. Parametric Linear Programming. Upper Bound Technique.

Unit-III Transportation problems. Formulation of transportation problems. Solutions of Transportation problems, North-West corner method. Least cost method. Assignment Problems. It's mathematical formulation, Solution of assignment problems. Optimality test.

Unit-IV Network Analysis-Shortest Path Problem. Minimum Spanning Tree Problem. Maximum Flow Problem. Minimum Cost Flow Problem. Network Simplex Method. Project Planning and Control with PERT-CPM.

References:

1. K. Swarup, P.K. Gupta and M. Mohan, Operations Research, Sultan Chand & Sons, N.Delhi.
2. F.S. Hillier and G.J. Ueberman. Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995. (This book comes with a CD containing tutorial software Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
3. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
4. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
5. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network flows, John Wiley I & Sons, New York, 1990.

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6. H.A. Taha, Operations Researc~-An introduction, Macmillan Publishing Co., Inc., New Yark.
7. S.S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
8. P. K.. Gupla and D.S. Hira, O. R.-An Introduction. S. Chand & Co.y Ltd., N.Delhi.
9. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.

Chairperson / H.O.D - Dr. Padmavati 6/7/24 Subject Expert - Dr. Madhu Shrivastava 6-07-24 Subject Expert - Dr. Shabnam Khan Subject Expert - Dr. S. K. Bhatt **Representative Members** 1. Dr. Anil Kashyap - 2. Shri A. K. Pandey - 3. Dr. Mayur Puri Goswami -	**Faculty members:** Dr. M.A. Siddiqui – Dr. Rakesh Tiwari – Dr. (Smt.) Prachi Singh –

M. Sc. Mathematics (Third Semester)
2024 – 2025

Paper- V (A)
Code- MMT 305 (A)
Fuzzy Set and their Applications (I)

Max. Marks. 80

Unit-I Fuzzy sets. Basic definitions. α-level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Type of fuzzy sets. The Extension principle-the Zadeh's extension Principle. Cartesian products. Algebraic products. Bounded sum and difference,t-norms and t- conorms. ,Image and inverse image of fuzzy sets.

Unit-II Fuzzy numbers. Elements of fuzzy arithmetic. Fuzzy Relations and Fuzzy Graphs. Fuzzy relations on fuzzy sets. Composition of fuzzy relations.

Unit-III Min-max Composition and its properties. Fuzzy equivalence. Relations. Fuzzy compatibility. Relations. Fuzzy relation equation. Fuzzy graphs. Similarity relation.

Unit-IV Possibility Theory. Fuzzy measures. Evidence theory. Necessity measure. Possibility measure. Possibility distribution. Possibility theory and fuzzy sets. Possibility theory versus probability theory.

References:

1. Fuzzy sets and fuzzy logic by G.K. Klir and B. Yuan, Prentice-Hall of, New Delhi, 1995.
2. Fuzzy set theory and its Applictions , By H.J.Zimmermann , Allied Publishers Ltd., New Delhi , 1991.

Chairperson / H.O.D - Dr. Padmavati 6/7/24

Subject Expert - Dr. Madhu Shrivastava 6-07-24

Subject Expert - Dr. Shabnam Khan

Subject Expert - Dr. S. K. Bhatt

Representative Members

1. Dr. Anil Kashyap -
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Faculty members:

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M. Sc. Mathematics (Third Semester)
2024 – 2025

Paper- V (B)
Code- MMT 305 (B)
Graph theory (I)

Max. Marks - 80

Unit-I: Operations on graphs, matrices and vector spaces: Topological operations, Homeomerphism, homomorphism, contractions, derived graphs, Binary operations.

Unit-II: Matrices and vector spaces: Matrices and vector spaces: The adjacencymatrix, The determinant and the spectrum, Spectrum properties, The incidence matrix, cycle space and Bond space, Cycle bases and cycle graphs.

Unit-III: Coloring packing and covering: Vertex coverings, critical graphs, Girth and chromatic number, uniquely colourable graphs, edge-colourings, Face colourings and Beyond, The achromatic and the Adjoint Numbers.

Unit-IV: Combinational formulations: Setting up of combinational formulations, theclassic pair of duals, Gallai, Norman-Rabin Theorems, Clique parameters,The Rosenfeld Numbers.

Unit-V: Perfect Graphs: Introduction to the "SPGC", Triangulated (Chordal) graphs, Comparability graphs, Interval graphs, permutation graphs, circular arc graphs, split graphs, weakly triangulated graphs.

REFERENCES :

1. Gary Chartrand and Ping Zhang Introduction to Graph Theory, graw Hill publishing company limited .
2. J. A. Bondy and U. S. R. Murthy, Graph Theory with Applications, Noth Holland Publisher.
3. K. R. Parthasarathy, Basic graph theory, Tata Mc graw Hill publishing company limited , 1994.
4. R. J. Wilson, Introduction to graph theory, Longman Harlow, 1985.
5. John Clark, Derek Allon Holton, A first look at graph Theory, World Scientific Singapore, 1991.
6. Frank Hararary, Graph Theory Narosa, New Delhi, 1995.
7. Ronald Gould and Benjamin Cummins, Graph Theory, California.

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8. Narsingh Deo, Graph Theory with applications to Engineering and Computer Science, Prentice-Hall of India Private Limited, New Delhi, 2002.

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