

**MATA GUJRI MAHILA MAHAVIDYALAYA(AUTO.), JABALPUR****DEPARTMENT OF MATHEMATICS 2017-18****M.Sc. (MATHEMATICS) FOURTH SEMESTER**

<b>Name of the Papers</b>	<b>Theory (MM)</b>	<b>Min. Pass. Mark</b>	<b>C.C.E.</b>	<b>Min. Pass. Mark</b>	<b>Practical Max. Mark</b>	<b>Practical Min. mark</b>	<b>Total</b>
<b>Paper VI: Operations Research</b>	35	12	15	05	--	--	50
<b>Paper VII: Programming in C (Theory and Practical) -II</b>	25	09	10	04	15	06	50
<b>Paper X: Theory of Linear Operators</b>	35	12	15	05	--	--	50
<b>Paper XI: Fuzzy Sets and their Applications – II</b>	35	12	15	05	--	--	50
<b>Paper XII: Integral Transform-II</b>	35	12	15	05	--	--	50
<b>Job- Oriented Project Work &amp; Attendance (Compulsory )</b>							50 =40+10
<b>Comprehensive Viva-Voce (Compulsory )</b>							50
<b>Grand Total</b>							<b>350</b>

**In attendance 10 marks is allocated as per ordinance No. 79 of R.D. University Jabalpur.**

**The students, whose attendance is less as per ordinance No. 79 of R.D. University Jabalpur, will not allow to appear in the examination at the close of semester and he/she would be declared having failed in that semester.**

**In project 40 marks is allocated. Out of 40 marks, 15 marks is allocated for project file, 15 marks is**

**allocated for presentation of their project work and 10 marks is allocated for project Viva-Voce examination.**

**At the end of IV semester a Project Viva-Voce is to be conducted by a board of at least three examiner which includes at least on external examiner.**

**At the end of IV semester a Comprehensive Viva-Voce is to be conducted by a board of at least three examiner which includes at least one external examiner.**

# MATA GUJRI MAHILA MAHAVIDYALAYA(AUTO), JABALPUR

## M.Sc. (MATHEMATICS) FOURTH SEMESTER

### Paper I: Operations Research

Max. Marks: 35

Min. Pass. Marks: 12

<b>Unit I</b>	Operations Research and its scope. Origin and Development of Operations Research, Characteristics of Operations Research, Model in Operations Research, Phase of Operations Research, Uses and Limitations of Operations Research, Linear Programming Problems, Mathematical Formulation, Graphical Solution Method.
<b>Unit II</b>	Inventory theory : Inventory models on economic lot size system with uniform and non uniform demand, Economic lot size with finite rate of replenishment, A simple order level system with constant rate of demand with shortage, Generalized economic lot size model, Multi items deterministic models, Probabilistic model, Instantaneous demand, no setup cost model, Uniform demand, no setup cost model
<b>Unit III</b>	Waiting lines, distribution theorem, classification of queuing model: models: (M/M/1): ( $\infty$ /FCFS), (M/M/1) (N/FCFS). General Erlang queuing model, (M/M/S): ( $\infty$ /FCFS), (M/M/S): (N/FCFS), (M/Ek/1): ( $\infty$ /FCFS).
<b>Unit IV</b>	Network analysis, constraints in Network, Construction of network, critical Path Method (CPM)PERT, PERT Calculation, Resource Leveling by Network Techniques and advances of network (PERT/CPM), Replacement problem: Replacement problem when money value does not change/changes with Time, Group replacement policy, Mortality theorem.
<b>Unit V</b>	Game theory- Two persons, Zero-sum Games, Maximin - Minimax principle, games without saddle points- Mixed strategies, Graphical solution of $2 \times m$ and $m \times 2$ games, Solution by Linear Programming, Non-Linear programming Techniques-Kuhn-Tucker Conditions, Non-negative Constrains.

#### TEXT BOOKS:

1. Kanti Swarup, P.K. Gupta and Manmohan, Operations Research, Sultan Chand & Sons, New Delhi.

#### REFERENCE BOOKS:

1. S.D. Sharma, Operations Research.
2. F.S. Hiller and G.J. Lieberman, Industrial Engineering Series, 1995(This book comes with a CD, containing software

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## M.Sc. (MATHEMATICS) FOURTH SEMESTER

### PAPER VII: PROGRAMMING IN C (THEORY AND PRACTICAL)

Max. Marks: 25

Min. Pass. Marks: 09

Unit I	An overview of programming languages, Classification. C Essentials-Programs development Functions, <b>ansomy</b> of a function, Variables and Constants Expressions, Assignment Statements, Formatting, Source files Continuation Character the Pre processor.
Unit II	Scalar Data types-Declarations, Different Types of integers .Different kinds of integers Constants Floating–point type Initialization, Mixing types Explicit conversions –casts, Enumeration Types, the void data type, Typedefs Pointers.
Unit III	Control Flow-Conditional Branching, the Switch statements, looping nested loops, the Break and continue Statement, the goto statement infinite loops.
Unit IV	Operators and Expressions-Precedence and associativity. 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 operators, size of operators, Conditional operators, memory operators.
Unit IV	Arrays and multidimensional Arrays, Storage Classes- fixed vs. Automatic Duration Scope, global variables, The Register Specifier, Structures and Unions.

#### Recommended Books:

Peter A. Darnell and Philip E. Margolis, C: A software Engineering Approach narosa Publishing House (Springer international student edition)1993.

#### Reference Books

1. Samuel P Harkison Gly L Steele Jr.C: A Reference manual ; 2<sup>nd</sup> Edition Prentice hall 1984
2. W Kernighaun & Dennis M Ritchie the Programmed Language 2<sup>nd</sup> adition (ANSI features), Prentice Hall 1989.

# MATA GUJRI MAHILA MAHAVIDYALAYA(AUTO), JABALPUR

## M.Sc. (MATHEMATICS) FOURTH SEMESTER

### Paper III : Theory of Linear operators

Max. Marks: 25

Min. Pass. Marks: 12

Unit-I	Spectral theory in normed linear spaces, resolvent set and spectrum, spectral properties of bounded linear operators, Properties of resolvent and spectrum, Spectral mapping theorem for polynomials
Unit-II	Spectral radius of a bounded linear operator on a complex Banach space, Elementary theory of Banach algebras, General properties of compact linear operators,
Unit-III	Spectral properties of compact linear operators on normed spaces, Behaviours of compact linear operators with respect to solvability of operators equation,
Unit-IV	Fredholm type theorems. Fredholm alternative theorem, Fredholm alternative for integral equations, Spectral properties of bounded self-adjoint linear operators on a complex Hilbert space,
Unit-V	Positive operators, Monotone sequence theorem for bounded self- adjoint operators on a complex Hilbert space, Square roots of a positive operator, Projection operators.

#### Recommended Books:

1. E. Kreyszig, Introductory Functional Analysis with Applications, John-Wiley & Sons, New York, 1978.

#### Reference Books:

1. P.R. Halmos, Introduction to Hilbert Space and the Theory of Spectral Multiplicity, Second Edition, Chelsea Publishing Co., New York, 1957.
2. N. Dunford and J.T. Schwartz, Linear Operators 3 Parts, Interscience/Wiley, NewYork,1958-71.
3. G. Bach man and L. Narici, Functional Analysis, Academic Press, York, 1966.

# MATA GUJRI MAHILA MAHAVIDYALAYA(AUTO), JABALPUR

## M.Sc. (MATHEMATICS) FOURTH SEMESTER

### Paper IV: Fuzzy Sets and their Applications - II

Max. Marks: 35

Min.Pass.Marks: 12

- Unit -I** Fuzzy sets: Basic Definitions,  $\alpha$ -level sets, Convex fuzzy set, Basic operations on fuzzy sets, types of fuzzy sets, Extensions: Types of fuzzy sets, Further operations on fuzzy sets, Cartesian product, Algebraic products, Bounded sum and Difference, t-norm & t-conorm.
- Unit – II** Extension principle and applications, Zadeh extension principle, image and inverse image of fuzzy sets, fuzzy numbers, algebraic operations with fuzzy numbers, extended operation and its properties, Special extended operation, addition, subtraction, product and division of fuzzy numbers. Fuzzy relations on fuzzy sets, The union & intersection of fuzzy relations, Composition of fuzzy relations,
- Unit - III** max-\* and max-product compositions, min-max composition and its properties, reflexivity, symmetry, transitivity, and their examples, special fuzzy relations, similarity relation.
- Unit - IV** Fuzzy graphs: Definition and Examples, Fuzzy sub-graph, Spanning sub-graph, path in a fuzzy graph, strength and length of a path, -length and -distances, connected nodes, fuzzy forest, fuzzy tree, Examples, Fuzzy Analysis: Fuzzy functions on fuzzy sets, classical function, fuzzy function, Examples.
- Unit -V** Fuzzy Logic; classical logic an overview, multi-valued logic, Fuzzy proposition unconditional and unqualified proposition, unconditional and qualified propositions conditional and unqualified proposition, An overview of classical conditional and qualified proposition, Fuzzy qualifiers Linguistic hedges logic, Its connectives, Tautologies, Contradiction, Fuzzy.

#### Text books:

1. Fuzzy set theory and its Applications by H.J. Zimmermann, Allied Publishers Ltd., New Delhi, 1991 (For Units I to IV).
2. Fuzzy sets and Fuzzy Logic Theory & Application by G.J. Klir and B. Yuan, Prentice Hall of India, New Delhi, (2000) (For Unit V).

#### Reference Books:

1. Fuzzy Logic with Engineering Applications by T.J. Ross, John Wiley & Sons, IInd Ed., 2005

# MATA GUJRI MAHILA MAHAVIDYALAYA(AUTO), JABALPUR

## M.Sc. (MATHEMATICS) FOURTH SEMESTER

### Paper V: Integral Transform - II

Max.Marks:35

Min PassingMarks:12

Unit-I	Application of Laplace Transforms :Laplace's Equations, Laplaces Wave Equations Application to Dynamics
Unit-II	Application of Laplace Transforms in Heat Conduction Equation.
Unit-III	Application of Laplace Transforms to Boundary value problems. Electric Circuit, Application to Beams.
Unit-IV	The Complex Fourier Transforms, Inversion Formula, Fourier cosine and sine Transforms.Properties of Fourier Transforms, Convolution and Parseval's identity.
Unit-V	Fourier Transforms of the Derivatives , Finite Fourier Sine and Cosine Transform , Inversion operational and combined properties Fouries transform.

#### **Text Books:**

1. Integral Transforms by Goyal and Gupta.
2. Integral Transforms by Sneddon.

**Note :** Syllabus opted by the board of studies in mathematics Mata Gujri Mahila Mahavidyalaya , Jabalpur (with 20% Modification i.e. in Unit one) for session. 2017-18