RANI DURGAVATI UNIVERSITY, JABALPUR

SYLLABUS OF M.A./M.Sc. MATHEMATICS SEMESTER SYSTEM SEMESTER – III

(Session 2017-18 and onwards)

Syllabus opted by the board of studies in Mathematics, R.D. University in the meeting held on 30-04-2016.

Choose any **five Papers** from following list of twelve papers.

Name of the Papers (Choose any five)	**Theory (MM)**	**Min. Pass. Mark**	**C. C. E.**	**Min. Pass. Mark**	**Practical M .M.**	**Min. Pass mark**	**Total**
Paper I : Applied Functional Analysis	35	12	15	05	--	--	50
Paper II: Approximation Theory	35	12	15	05	--	--	50
Paper III: Divergent Series	35	12	15	05	--	--	50
Paper IV: Fuzzy Sets and their Applications - I	35	12	15	05	--	--	50
Paper V: Operator Theory on Banach Algebra	35	12	15	05	--	--	50
Paper VI: Simplicial Homology Theory	35	12	15	05	--	--	50
Paper VII : Advanced Numerical Analysis	35	12	15	05	--	--	50
Paper VIII: Linear Programming	35	12	15	05	--	--	50
Paper IX: Mathematical Statistics	35	12	15	05	--	--	50
Paper X: Programming in C (Theory and Practical) –I	25	09	10	04	15	06	50
Paper XI: Special Functions	35	12	15	05	--	--	50
Paper XII: Spherical Trigonometry and Astronomy	35	12	15	05	--	--	50
Internship and Attendance (Compulsory)							100=90+10
Grand Total							**350**

Note:

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

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M.A./M.Sc. (Mathematics) Third Semester
Paper VII: Advanced Numerical Analysis

Max. Marks: 35
Min. Pass. Marks: 12

Unit 1-

Piece wise and spline interpolation, Bivariate inter polation Approximation, least squares approximation

Unit 2-

Uniform approximation Rational approximation, choice of method, numerical differantiation optimum choice of step length

Unit 3 –

Extrapolation methods ordinary differential equations. multi step methods Predicator and corrector method, stability analysis of multistep methods.

Unit 4–

Ordinary differential equation – boundary value problems shooting method.

Unit 5-

Finte difference methods, finite element method

Text book –

Numerical Mmethod for scientific and Engineering computation by M.K. Jain, S.R.K. Iyenger, R.K. Jain south Edition (2003) New Age.

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M.A./M.Sc. (Mathematics) Third Semester
Paper VIII: Linear Programming

Max. Marks: 35
Min. Pass. Marks: 12

Unit-1	General Linear Programming Problem, Formulation of the Linear Programming Problem, Solution by Graphical method, Simplex method.
Unit-2	Solution of a Linear Programming Problem by Big-M method, Two phase method, concept of duality, Fundamental theorem of duality, Dual simplex method.
Unit-3	Assignment problem, Solution of assignment problem, Unbalanced Assignment Problem, Crew Assignment problem, Traveling Salesman problem.
Unit-4	Transportation problem, Initial basic feasible solution, Vogel's Approximation method, Optimality test by MODI method, Stepping Stone method, Degeneracy in Transportation Problem.
Unit-5	Sequencing problem, processing n jobs on two machines, n jobs on three machines, n jobs on m machines, processing two jobs through m machines.

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)
3. H. Hadley, Linear and Dynamic programming, Addison-Wesley Reading Mass.
4. H.A. Taha, Operations Research- An introduction, Macmillan Publishing Co. Inc. New York.
5. Prem Kumar Gupta and D. S. Hira, Operations Research, an Introduction, S. Chand & Company Ltd. New Delhi.
6. N. S. Kambo, mathematical Programming Techniques, Affiliated East- West Pvt. Ltd. New Delhi, Madras.

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M.A./M.Sc. (Mathematics) Third Semester
Paper X: Programming in C (Theory and Practical) -I

Max. Marks: 25
Min. Pass. Marks: 09

Unit-1	An overview of programming languages.
Unit-2	Classification. C Essentials – Programs development, Functions.
Unit-3	Anatomy of a Function. Variables and Constants Expressions. Assignment Statements. Formatting Source files Continuation Character. the Preprocessor.
Unit-4	Scalar Data types – Declarations, Different Types of integers. Different kinds of Integer Constants Floating – point type Initialization.
Unit-5	Mixing types Explicit conversions – casts. Enumeration Types. the void data type , Typedefs. Pointers.

Reference Books:

1 Samuel P. Harkison and Gly L Steele Jr. C; A Reference manual , 2an Edition Prentice hall 1984.
2 Brain W Kernigham & Dennis M Ritchie the C Programmed Language 2nd Edition (ANSI features), Prentice Hall 1989.

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M.A./M.Sc. (Mathematics) Third Semester
Paper XI: Special Functions

Max. Marks: 35
Min. Pass. Marks: 12

Unit I Gamma and Beta Functions : The Euler or Mascheroni Constant γ, Gamma Function, A series for $\Gamma'(z) / \Gamma(z)$, Difference equation $\Gamma(z+1) = z\Gamma(z)$, Euler's integral for $\Gamma(z)$, Beta function, value of $\Gamma(z)\,\Gamma(1-z)$, Factorial Function, Legendre's duplication formula, Gauss multiplication theorem.

Unit - II Hypergoemetric and Generalized Hypergeometric functions: Function 2F1 (a,b;c;z) A simple integral form evaluation of 2F1 (a,b;c;z) Contiguous function relations, Hyper geometrical differential equation and its solutions, F (a,b;c;z) as function of its parameters, Elementary series manipulations, Simple transformation, Relations between functions of z and 1 –z

Unit-III Bessel function and Legendre polynomials : Definition of Jn (z), Bessel's differential equation, Generating function, Bessel's integral with index half and an odd integer, Generating function for Legendre polynomials Rodrigues formula, Bateman's generating function, Additional generating functions, Hypergeometric forms of Pn (X) , Special properties of PnX), Some more generating functions, Laplace's first integral form, Othergonality.

Unit-IV Hermite polynomial : Definition of Hermite polynomials Hn(x), Pure recurrence relations, Differential recurrence relations, Rodrigue's formula, Other generating functions, Othogonality, Expansion of polynomials, more generating functions.

Unit-V Laguerre Polynomials :The Laguerre Polynomials Ln(X), Generating functions, Pure recurrence relations, Differential recurrence relation, Rodrigo's formula, Orthogonal, Expansion of polynomials, Special properties, Other generating functions.

Books Recommended ;

1- Rainville, E.D, ; Special Functions, The Macmillan co., New york 1971,
2- Srivastava, H.M. Gupta, K.C. and Goyal, S.P.; The H-functions of One and Two Variables with applications, South Asian Publication, New Delhi.
3- Saran, N., Sharma S.D. and Trivedi, - Special Functions with application, Pragati prakashan, 1986.

Reference Books.

1- Lebdev, N.N, Special Functions and Their Applications, Prentice Hall, Englewood Cliffs, New jersey, USA 1995.
2- Whittaker, E.T. and Watson, G.N., A Course of Modern Analysis Cambridge University Press, London, 1963.

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M.A./M.Sc. (Mathematics) Third Semester
Paper XIII: Spherical Trigonometry and Astronomy

Max. Marks: 35
Min. Pass. Marks: 12

Unit-I: Spherical Trigonometry – up to solution of right angled triangles.

Unit-II: General ideas and relation between sides and angles of a spherical triangle.

Unit-III: Spherical Astronomy – Various system of references and related topics.

Unit-IV: Celestial sphere, Transit instrument.

Unit-V: Atmospheric Retraction. Time planetary phenomena.

TEXT BOOKS:

1 A text book of spherical trigonometry : Gorakh Prasad.
2 A text book of spherical Astronomy : Gorakh Prasad.

REFERENCE BOOKS:

1 Spherical Astronomy – Smart.
2 Spherical Astronomy – Bell.

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