

BHAGWANT UNIVERSITY

Sikar Road, Ajmer

Rajasthan



Syllabus

Institute of Applied Sciences & Life Sciences

M. Phil I Semester

Mathematics

Course Category

MMat : M.Phil in Mathematics

CCC: Compulsory Core Course

ECC: Elective Core Course

Contact Hours:

L: Lecture

T: Tutorial

P: Practical or Other

Marks Distribution :

IA: Internal Assessment (Test/Classroom

Participation/Quiz/Presentation/Assignment etc.)

EoSE: End of Semester Examination

M. Phil (Mathematics)

(Course Structure)

Subject code	Subject Name	Teaching hours			Marks		
		L	T	P	External	Internal	Total
01MMat101	Research Methodology	3	0	0	70	30	100
01MMat102	GENERALIZED HYPERGEOMETRIC FUNCTIONS AND FRACTIONAL CALCULUS	3	0	0	70	30	100
01MMat103	ADVANCED	3	0	0	70	30	100

	OPERATION RESEARCH						
01MMat104	DIFFERENTIAL FORM AND COSMOLOGY	3	0	0	100		100
	Total	12	0	0	280	120	400

PAPER 1 RESEARCH METHODOLOGY

01MMat101

Special Function and Generalized Special Function, Generating Function.

Fundamental Tensor, Tensor, Geodesics, Bianchi Identities, Flat Space, Einstein Tensor.

Basic elements of a mathematical Research Paper.

Power Point Presentation of a Research Method/Research Work/Research Paper.

Probability distribution, Normal Distribution, Test of Significance (t, F, X^2 , Z), Analysis of variance, Sampling, estimation.

Mathematical Type setting in Equation Editor

Expression, Equation, Matrices Numerical Formulas, Solution of algebraic equation and differential Equations by using matrix operator theory.

Various types of integral & differential operators and their applications in different disciplines.

Geometric properties of generalized functions.

Linear and Non Linear Programming Problems.

PAPER II – GENERALIZED HYPERGEOMETRIC FUNCTIONS AND FRACTIONAL CALCULUS

01MMat102

UNIT :I

Meijer's G-Function: Definition ,Elementary properties, Multiplication formulas

UNIT :II

Derivatives, Recurrence relations Mellin and Laplace transforms of the G-Function.

UNIT:III

H-function of one and two variables: definition, Identities, Special cases, Differentiation formulas,

UNIT:IV

Recurrence and Contiguous function relation, Finite and Infinite series, Simple Finite and Infinite integrals involving H- function .

UNIT :V

Fractional calculus: Riemann Liouville fractional Integrals and Derivatives definition.

References:

1. Mathai and Saxena : Generalized Hyper geometric fuctions with applications in Statistics and Physical Sciences, Springer Veriag
2. Mathai and Saxena : The H- Function with applications in Statistics and other disciplines. Jhon Wiley & Sons. New York.Chapter 1,3
3. Ross and Miller : Fractional Calculus.

PAPER III - ADVANCED OPERATIONS RESEARCH

01MMat103

UNIT :I

Inventory Control: Deterministic and probabilistic model, price break inventory, Replacement, Renewal theory, maintenance and Reliability.

UNIT :II

Transportation Problem: A Streamlined simplex method for the transportation Problem, Stepping Stone Method, Transshipment problem.

UNIT :III

Assignment Problem: Traveling Sales person problem.

Queuing Theory: The Birth and Death process, Queuing models involving non-exponential distributions.

UNIT :IV

Project Management: Networks, Shortest Route problem, Minimal spanning tree problem, Maximum flow problem, project planning and control with PERT CPM.

UNIT :V

Simulation: Phases of Simulation model, Monte Carlo Simulation.

References:

1. Operations Research : Hiller & Leberman
2. Analysis of Inventory System : Within and Heddley
3. System Simulation : G. Gordon

PAPER IV - DIFFERENTIAL FORM AND COSMOLOGY

01MMat104

UNIT :I

Differential forms in Relativity: Lie derivatives, Symmetry and killing's equations, Spherical symmetric and plane symmetric space-time. Basic ideas, Definition.

UNIT :II

Rimannian Geometry: Basic 1- forms, Connection 1-forms, Co-ordinate Frame, Equation of structure, Curvature 2-forms, Identities for curvature. Two examples (Vaidya metric & one other.)

UNIT :III

Non-Static Cosmological models: Cosmological Principles; Einstein fields equations in cosmology. Energy momentum tensors of the universe, Hubble's law

UNIT :IV

Weyl's hypothesis. Robertson-Walker metric. Doppler effect in Robertson-Walker metric. Friedmann-Robertson-Walker model. Horizons in FRW models.

UNIT :V

Alternative Cosmologies: Mach's Principle. Brans-Dicke Theory of gravity. Cosmological solutions in the Brans – Dicke theory.

Reference:

1. General Relativity and cosmology : J.V. Narlikar.
2. Introduction to Cosmology : J.V. Narlikar. Cambridge. univ. Press.
3. Introduction to General Relativity : R. Adler, M. Bazin, M. Schffer.
4. Differential forms in general relativity : W. Isreal Dublin.

