

BHAGWANT UNIVERSITY
Sikar Road, Ajmer
Rajasthan



Syllabus

Institute of Life Sciences & Applied Sciences
M. Phil
(Math's)

ANNUAL SCHEME OF EXAMINATION:

1. Every candidate shall be required to offer three written papers and one dissertation (equivalent to one paper). Within this frame work the Board of Studies shall recommend the course of study for the M. Phil examination.
2. The course of study for the M. Phil degree shall extend over a period of one academic year. There shall be a continuous internal assessment and as external assessment. The proportion of internal and external assessment shall be 30:70. There will be no internal assessment in the dissertation. Total marks for M. Phil will be 400. Dissertation may be written by the candidates under the supervision of any teacher who is registered as M. Phil Supervisor. Supervisor can guide normally five dissertations. However, the maximum limit may be relaxed by the permission of Vice-Chancellor on the recommendation of Head. The internal Supervisor can guide five candidates and workload of six hours is admissible for each M. Phil course for dissertation. The Supervisor will sign and issue a certificate counter signed by the Head of department concerned.
3. The internal assessment may be evaluated on the basis of:
 - (a) Mid Terms : 15 Marks
 - (b) Assignments /Seminar Presentation /Group Discussion: 15 Marks
4. Each theory paper shall consist of 100 marks. The dissertation shall also consist of 100 marks. For a pass, a candidate shall be required to obtain (a) at least 40% marks in each paper separately (b) a minimum of 50% marks in the aggregate of all the papers prescribed for the examination. In the mark sheet, successful candidates shall be classified as under

First Division	65% or more.
Second Division	50-65%
- 6- A candidate will have to pass individually both in the Internal as well as external examination and it should be shown separately in the marks sheet.
- 7- The placement of every candidate under a Supervisor/Guide shall be decided within two months from the last date for admission.
- 8- A candidate who fails at the examination even in one paper/dissertation shall be required to reappear at the examination in a subsequent year in all the papers/dissertation prescribed for the examination, provided that a candidate who obtains at least 50% marks in dissertation shall be exempted from the submitting a fresh dissertation and the marks obtained by him shall be carried forward for working out his result.
- 9- For each theory paper 10 questions will be set for the final examination and the candidate will have to attempt at least five questions. All the questions will carry equal marks.
- 10- Workload distribution: There will be a teaching of four periods of one hour duration per week for each theory paper and six hours for dissertation.
i.e. 4X3 = 12 hours for theory papers and six hours for dissertation per week.

Papers Number	Paper Code	Papers Name	TEACHING PERIOD			External Marks	Mid Terms carrying 15 marks	Internal Assignments /Seminar Presentation /Group Discussion	G. Total
			L	T	P				
Paper I,II,III	01MPL1610 1	RESEARCH METHODOLOGY	3	1	0	70	15	15	100
	01MPL1610 2	ANYTWO GENERALIZED HYPERGEOMETRIC FUNCTIONS AND FRACTIONAL CALCULUS	3	1	0	70	15	15	100
	01MPL1610 3	ADVANCED OPERATIONS RESEARCH				70	15	15	100
	01MPL1610 04	DIFFERENTIAL FORM AND COSMOLOGY							
	01MPL1610 05	ADVANCED NUMERICAL ANALYSIS							
Paper IV	01MPL1620 1	DESSERTATION				100			100
		TOTAL	3	1	0	310	45	45	400

Grand Total-400

PAPER 1 RESEARCH METHODOLOGY

01MPL16101

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.

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.

PAPER II – GENERALIZED HYPERGEOMETRIC FUNCTIONS AND FRACTIONAL CALCULUS

01MPL16102

Note: There will be Ten questions in all. Candidates are required to attempt any Five questions. All questions carry equal marks.

Meijer's G-Function: Definition ,Elementary properties, Multiplication formulas Derivatives, Recurrence relations Mellin and Laplace transforms of the G- Function.

H-function of one and two variables: definition, Identities, Special cases, Differentiation formulas, Recurrence and Contiguous function relation, Finite and Infinite series, Simple Finite and Infinite integrals involving H-function .

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

01MPL16103

Note: There will be TEN questions in all. Candidates are required to attempt ANY FIVE questions. All questions carry equal marks.

Problem formulation and model construction.

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

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

Assignment Problem: Traveling Sales person problem.

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

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

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
4. Operations Research : S.D. Sharma

PAPER IV - DIFFERENTIAL FORM AND COSMOLOGY

01MPL16104

Note: There will be TEN questions in all. Candidates are required to attempt ANY FIVE questions. All questions carry equal marks.

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

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

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

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

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.

PAPER V - ADVANCED NUMERICAL ANALYSIS

01MPL16105

Error in Numerical Calculations: Numbers and their accuracy, errors and their analysis, General error formula, Error in a series Approximation.

Two point Boundary value problems: Linear ordinary differential equations, Non-Linear ordinary differential equations, Non-uniform grid methods for the Second order Boundary value problems.

Numeric Solution of Integral Equations: Integral equation, Finite difference methods, Methods of degenerate Kernets, Method of Invariant Impeding, method using Generalized Quadrature, Evaluation of singular integrals.

Numerical Solution of Partial Differential Equations: Finite difference Approximations to Derivatives, Laplace's Equations, Jacobi's method, Gaussiedel and successive over Relaxation methods, Parabolic and Hyperbolic equations Iterative Method and choice of initial approximation.

Finite Element Methods: Introduction, Residual Methods, Variational methods, Elements, Assembly of elements equadic application value problems and initial value problems such as flow or local fluids, Fluids, Transient heat condition.

Reference:

1. Numerical Methods for Scientific and Engineering Computation: Jain, Lynger, Jain.
2. Numerical Analysis : Sastri,S.S

M. Phil Dissertation

01MPL16201

Each student will submit dissertation on any one topic related to mathematics. Dissertation will be guided by supervisor of the university and will be examined by external.

