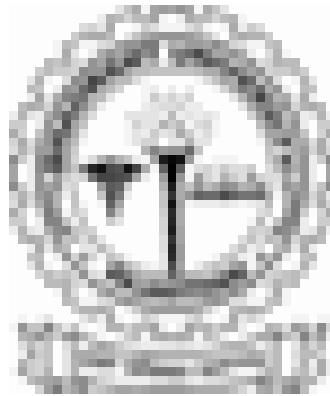


BHAGWANT UNIVERSITY

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

SEMESTER II

Subject code	Subject Name	Teaching hours			Marks		
		L	T	P	External	Internal	Total
02MMat101	Advanced Research Methodology	3	0	0	70	30	100
02MMat102	Functional Analysis	3	0	0	70	30	100
02MMat103	General Skills In Geometry	3	0	0	70	30	100
02MMat104	Dissertation	3	0	0	50	50	100
Total		12	0	0	260	140	400

PAPER 1 RESEARCH METHODOLOGY

01MMat101

Unit - 01

Research - definition - importance and meaning of research - characteristics of research - types of research - steps in research - identification, selection and formulation of research problem – research questions - research design - formulation of hypothesis - review of literature

Unit - 02

Sampling techniques : sampling theory - types of sampling - steps in sampling - sampling and non-sampling error - sample size - advantages and limitations of sampling. Collection of data : primary data - meaning - data collection methods - secondary data - meaning - relevances, limitations and cautions.

Unit - 03

Statistics in research - measure of central tendency - dispersion - skewness and kurtosis in research. Hypothesis - fundamentals of hypothesis testing - standard error - point and interval estimates - important non-parametric tests : sign, run, kruskal - wallis tests and mann-whitney test.

Unit - 04

Para metric tests : testing of significance - mean, proportion, variance and correlation - testing for significance of difference between means, proportions, variances and correlation co-efficient. Chi-square tests - anova - one-way and two-way.

Unit - 05

Research report: types of reports - contents - styles of reporting - steps in drafting reports - editing the final draft - evaluating the final draft.

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
4. Operations Research : S.D. Sharma

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. Schiffer.
4. Differential forms in general relativity : W. Isreal Dublin.

SEMESTER II

PAPER I –ADVANCED RESEARCH METHODOLOGY (02MMAT101)

Unit I - Types of Research and Report writing

UNIT I

Basic concepts: Research process, problem identification, research designs, informal experimental designs. Completing randomised design, randomized block design, latinsquare design, factorial designs

UNIT II

Sampling and testing of hypothesis: Concept of probability, probability distribution, Normal, Poisson, χ -square, t-test. Sampling distribution, central limit theorem, Sandler's A-test, standard error, population mean, population proportion, sample size, confidence intervals, null hypothesis and alternative hypothesis, level of significance, two tailed and one tailed tests, Z-test, t-test, χ^2 -test, F-test, testing of correlation coefficients, ANOVA one way ANOVA, two way ANOVA Tukey's HSD.

UNIT III

Non-parametric tests: Sign test, Fisher-Irwin test, Mc Nemer test, Wilcoxon Mali test, Wilcoxon, Mann-Whitney test, Kruskal-Wallis test, one sample runs test. Spearman's rank correlation, Kendall's coefficient of concordance.

UNIT IV

Multivariate analysis: Multiple regression, multiple discriminant analysis, multiple analysis of variance, canonical correlation analysis, Factor analysis cluster analysis, path analysis. Computational techniques.

UNIT V

Computer Application, Basic of computer, System Software & application Software. Computer as a tool of Research: Application in Data Analysis, related software. MS Office, SPSS, Data Communication, LAN & WAN Data Exploration using internet tools, e-journal, e-books, basic concept of tele-conferencing & related configuration.

References:

1. Kothari, C.R.(2004). Research Methodology: Methods and Techniques, New Age International Publishers, New Delhi.
2. Arya., P.P. and Pal, Y.(2001) Research Methodology in Management: Theory and Case Studies. Deep and Deep Publishers Pvt. Ltd., New Delhi.

PAPER - II – FUNCTIONAL ANALYSIS(02MMAT102)

Unit I:

Topological Vector Spaces – Preliminaries, Separation properties, Linear Mappings, Finite dimensional spaces, Metrization.

Unit II:

Topological Vector Spaces: Continuation of Metrization - Boundedness and Continuity, Seminorms and Local convexity, Quotient spaces, Examples.

Unit III:

Completeness – Baire category theorem, The Banach - Steinhaus theorem, The open mapping theorem, The closed graph theorem, Bilinear mappings.

Unit IV:

Convexity – The Hahn-Banach Theorem, Weak topologies, Compact convex sets.

Unit V:

Duality in Banach spaces-The normed dual of a normed space, Adjoint, Compact operators.

PAPER III – GENERAL SKILLS IN GEOMETRY

Unit I:

Algebraic Results – Areas of triangles – Polar coordinates Equation to a locus – Straight line in Rectangular Coordinates – Polar Coordinates and in Oblique Coordinates.

Unit II:

Two or more straight lines – Transformation of Coordinates – Systems of circles.

Unit III:

Conic sections – The Parabola – The ellipse – The Hyperbola.

Unit IV:

Polar equation to a Conic – Tracing of Curves.

Unit V:

More general equations, the director circle etc.