

**MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR**

**M. A. / M. Sc. MATHEMATICS (FINAL)**

**2016-17**

**Non-Collegiate**

**Note-** There will be five papers in all. Paper-I: Topology and Functional Analysis and Paper-II: Discrete Mathematics will be compulsory. Each paper will be assigned six hours per week.

Paper I	Topology and Functional Analysis	100	3 Hrs.	6
Paper II	Discrete Mathematics	100	3 Hrs.	6

**Optional Papers**

Any three of the following paper with the permission of the Head of the Department of Mathematics & Statistics.

Paper III	Relativity and Cosmology	100	3 Hrs.	6
Paper IV	Viscous Fluid Dynamics	100	3 Hrs.	6
Paper V	Number theory	100	3 Hrs.	6
Paper VI	Numerical Analysis	100	3 Hrs.	6
Paper VII	Integral Equations and Internal Transforms	100	3 Hrs.	6
Paper VIII	Optimization Techniques	100	3 Hrs.	6
Paper IX	Advanced Topology	100	3 Hrs.	6
Paper X	Computer Programming	Th. 75 Per. 25	3 Hrs. 2 Hrs.	Th. 04 Pre. 02
Paper XI	Mathematical Theory of Statistics	100	3 Hrs.	6
Paper XII	Space Dynamics	100	3 Hrs.	6
Paper XIII	Astronomy	100	3 Hrs.	6
Paper XIV	Compressible Fluids and Magneto hydro Dynamics	100	3 Hrs.	6

**Note:**

\* **Scheme of Examination:**

**Question Paper Pattern for Examination: 100 marks**

Section A: Total 10 Question will be set from five units i.e. two question from each unit. These questions require very short answer. Each question will be of one (1) mark (Total 10 marks). All the questions in section A are compulsory.

Section B: Total 10 questions will be set from five units i.e. two question from each unit. Students are required to attempt at least one question from each unit. Each question carries 10 marks (Total 50 marks). The answer of each question should be given approximately in 250 words.

Section C: Total 4 descriptive question will be set from five units of the paper, not more than one question from each unit. Each question may also have two sub-division. Students are required to answer two questions in about 500 words. Each question carries 20 marks (Total 40 marks).

\*\* The right to information act, 2005 is applicable.

## **PAPER-VI NUMERICAL ANALYSIS**

**TIME: 3 hours**

**Max. Marks: 100**

### **UNIT-I**

Iterative methods: Simple iteration, theory of iteration, Acceleration a convergence, method for multiple and complex roots, Newton Rapson method for simultaneous equations, Convergence of iteration process in the case of several unknowns.

### **UNIT -II**

Solution of polynomial equations: Polynomial evaluation, real and complex roots, Synthetic division, The Birge – vita, Bairstow and Graeffe’s root squaring method.

System of Simultaneous equations(Linear): Direct method of determinant, Gauss – Elimination, Gauss- Jordan Cholesky, Partition method of Successive approximation, Conjugate Gradient , Gauss or Jacobi iteration, Gauss- Seidel and Relaxation methods.

### **UNIT- III**

Eigen value problems: Basic properties of Eigen values and Eigen vector power methods, Method for finding all Eigen pairs of a matrix, Complex Eigen values.

Curve fitting and Function Approximations: Linear square error criterion, Linear regression, Polynomial fitting and other curve fittings, Approximation of functions by Taylor series and Chebyshev Polynomials.

### **UNIT – IV**

Numerical Solutions of ordinary differential equations: Taylor series method, Euler’s and modified Euler’s methods, Runge Kutta method up to fourth order, multi step method( Predictor Corrector strategies ), Stability Analysis Single and Multi step methods.

### **UNIT- V**

Difference method for BVP’s ordinary Differential equations: Boundary value problems (BVP’s), Shooting methods, Finite Difference method, Difference scheme for non-linear boundary value

problem of the type  $y' = f(x, y)$ ,  $y'' = f(x, y, y')$  and  $y^{(iii)} = f(x, y, y', y'')$

### **Books Recommended:**

1. Jain, Iyenger and Jain : Numerical Analysis
2. Jain, M. K. : Numerical solutions of differential equation