

**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-V** **NUMBER THEORY**

**TIME: 3 hours**

**Max. Marks: 100**

### **UNIT-I**

Divisibility: Gcd and Lcm of two or more integers, Euclidean, algorithm, the linear diophantine equation  $ax + by = c$ . Prime Numbers, composite numbers, infinitude of primes, fundamental theorem of arithmetic.

Congruences: Basic properties, divisibility tests, linear congruences. Application of Congruences: Fermat's little theorem, Euler's generalization, Wilson's theorem Chinese remainder theorem.

### **UNIT-II**

Number Theoretic functions: T.J, and, Multiplicative functions, Mobius inversion formula, the greatest integer function. Primitive Roots and Indices, Primitive roots, characterization of natural numbers having primitive roots, theory of indices, solution of certain congruence, through indices. Quadratic Residues: Quadratic residues and quadratic non residues of an integer in general and of a prime in particular, Gauss Lemma and its applications, the quadratic reciprocity law.

### **UNIT-III**

Special Numbers: Fibonacci numbers, Fermat's numbers, Perfect numbers. Diophantine Equations: Representation of integers as sums of 2,3 and 4 squares.

Continued Fractions: Finite and infinite continued fraction convergent of a given continued fraction and their properties, Uniqueness of a continued fraction Periodic continued fraction, Pell's equation in general, characterization of solutions of  $x-dy = 1$  in terms of its smallest positive solution.

### **UNIT-IV**

Algebraic number fields and their rings of integers, Calculations for quadratic and cubic cases. Localization , Glois extension.

### **UNIT- V**

Dedekind rings, discrete valuation rings completion, unramified and ramified extensions, different discriminates, cyclotomic fields, roots of unity.

#### **Books Recommended:**

1. Donald M.Burton : Elementary Number Theory, Allyn and Bacon Inc.
2. Niven & H.S. Zuckerman : An Introduction to the Theory of Numbers. Willey eastern India Ltd.
3. Lang, S. : Algebraic Number theory, GTM Vol. 110, Springer-Verlag 194.