

**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-XII SPACE DYNAMICS**

**TIME: 3 hours**

**Max. Marks: 100**

### **UNIT- I**

Basic formula of a spherical triangle –The two body problem: the motion of the center of mass, the relative motion, Kepler's equation, Solution by Hamilton Jacobi theory.

The Determination of Orbits- Laplace Gauss method.

### **UNIT- II**

The three body Problem- General three Body problem, Restricted three Body problems, Jacobi integral Curves of zero velocity, Stationary Solutions and their Stability. The n- Body problem The Motion of the center of mass, Classical integrals.

### **UNIT- III**

Perturbation - Osculating orbit, Perturbing forces, Secular and Periodic perturbations, Legrange's Planetary equations in terms of pertaining forces and in terms of a perturbed Hamiltonian. Motion of the moon- The perturbing forces, perturbation of Keplerian elements of the Moon by the Sun.

### **UNIT- IV**

Flight Mechanics : Rocket performance in a vacuum, Vertically ascending path, Gravity twin trajectories Multistage rocket in a vacuum, Definitions pertinent to single stage rocket.

Performance limitations of single stage rockets, Definitions Pertinent of Multistage rockets, Analysis of Multi stage Rockets neglecting Gravity. Analysis of Multi stage rockets including Gravity

### **UNIT- V**

Rocket Performance with Aerodynamic forces short range non- lifting missiles: Ascent of a sounding rocket. Some approximate performance of a rocket- Powered air craft.

### **Books recommended:**

1. J.M.A. Danby : Fundamentals of celestial Mechanics.
2. E.Finlay, Freundlich : Celestial Mechanics.
3. Arigelo Miele : Flight Mechanics- Vol. I –Theory of flight paths.