

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-XIV

COMPRESSIBLE FLUIDS AND MAGNETO HYDRODYNAMICS

TIME: 3 hours

Max. Marks: 100

UNIT-I

Thermodynamic concepts, ideal gases, polytropic gases, Differential equations of motion, Conservation of energy Isentropic flow, Subsonic and supersonic flow, circulation, Bernoulli's law, Limi speed and critical speed.

UNIT-II

Steady and non-steady flows, Steady isentropic channel flow, solution of the equation of steady flow methods of small perturbation linearised flows, Prandtl-Glauert motion, hodograph method, limiting line.

UNIT-III

Basic equations of electrodynamics of continuous media-Maxwell's equations, Constitutive equations, Ohm's law for moving media. Electromagnetic body force, Coupled equations of electrodynamics and hydrodynamics, Conservation of mass momentum and energy.

Boundary condition, MHD approximation Magnetic pressure, similarity parameters and their significance, Frosen in fields, Magneto Hydrostatics and force free fields.

UNIT-IV

Steady MHD channel-flow problems-General equations and boundary conditions, Harlmann's and Pousseiulle flows, simple heat transfer problems, MHD waves Effect of Compressibility, Viscosity and finite conductivity, MHD shockwaves Stability problems-Stuart's and Lock's conditions, Chandrashekhar's contributions.

UNIT-V

Motion of charged particles in electromagnetic fields, Adiabatic invariants, Magnetic mirror and battle, Pinches and their stability problems, applications of MHD to flowmetry, Power generation,

MHD theories of sunspots and solar cycle, dynamo theories, elementary ideas of MHD boundary layers and turbulence.

Books recommended:

1. Millue Themson : Aero Dynamic
2. Sheroliff : Magneto hydrodynamics
3. Sutton and Sherman : Engineering MHD
4. Cowling : Magneto-Hydrodynamics.
5. Ferraro and Plumpton : Magnet of Fluid mechanics.
6. Chandrasekhar : Hydrodynamics and Hydromagnetics stability.