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-III
RELATIVITY AND COSMOLOGY

TIME: 3 hours **Max. Marks: 100**

UNIT-I

Geodesics, Null Geodesics, Geodesics Coordinates, Equation of Geodesics for the given metric. Riemann christoffel tensors and its significance, Curvature tensor, Ricci-tensor, Bianchi Identity.

UNIT-II

Energy momentum tensor and its expression for perfect fluid. Principle of covariance, principle of equivalence, condition for flat space time, Newtonian approximation of relativistic equation of motion. Einstein field equations and its Newtonian approximation. Schwarzschild exterior and interior relations for gravitational field.

UNIT-III

Planetary orbit, three crucial tests, Advance of perihelion, Gravitational. Deflection of light, shift in spectral lines, Weyl postulates, Franhaufer lines, Radar echo delay. Hubble law. Mach principle.

UNIT-IV

Static cosmological models of Einstein and De-Sitter, their derivation, properties and comparison with the actual universe, derivation of Robertson-Walker Metric. Hubble and Deceleration parameters. Red shift.

UNIT-V

Maxwell's equations in empty space, Energy momentum tensor for electromagnetic field, Einstein-Maxwell equation in General Relativity, Reissner Nordstrom solution.

Books Recommended:

1. P.G.Bergman : Introduction to Theory of Relativity
2. J.L.Synge : Relativity, The special Theory
3. J.L.Synge : Relativity, the General Theory
4. B.Spain : Tensor Calculus
5. J.L.Bansal : Tensor Analysis
6. J.V.Narlikar : Lecture on general Relativity.
7. Ray & Bali : Theory of Relativity
8. B.F.Shutz : A first course in General Relativity.