OPTIONAL PAPERS

Any three of the following papers with the permission of the Head of the Department of mathematics & statistics.

PAPER-III
RELATIVITY AND COSMOLOGY

Max. Marks: 100

TIME: 3 hours

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.