Name of Teacher: Prof. Pushpa Bindal

B. Sc. (Hons.) PHYSICS, Semester VI

Name of Paper	Allocation of Lectures	Month wise schedule followed by the Department	Tutorial/Assignment/ Presentation etc.
PAPER –DSE: Advanced Mathematical Physics II			
Unit 1 Cartesian Tensors: Transformation of co-ordinates under rotation of axes. Einstein's Summation Convention. Relation between direction cosines. Transformation Law for a tensor of rank n. Sum, inner product and outer product of tensors, contraction of tensors, Quotient Law of tensors, symmetric and anti-symmetric tensors. Invariant tensors (Kronecker and Alternating Tensor). Association of anti-symmetric tensor of rank two with vectors. Vector algebra and calculus in tensor notation. Differentiation, gradient, divergence and curl of Tensor Fields. Vector Identities in tensor notation.	12 lectures	Jan-Feb	Problems on transformation laws, Einstein summation convention, tensor algebra, Kronecker and Alternating Tensors
Unit 2: **Applications of Cartesian Tensors**: Equation of a Line, Angle between Lines, Projection of a Line on another Line, Condition for Two Lines to be Coplanar and Length and Foot of the Perpendicular from a Point on a Line. Rotation Tensor and its properties. Moment of Inertia Tensor, Stress and Strain Tensors, Elasticity Tensor, Generalized Hooke's Law, Electric Polarizability Tensor.	12 lectures	Feb-March	Problems on Analytical Solid Geometry, Moment of Inertia Tensor, Stress and Strain Tensors, Polarizability Tensor.
Unit 3: **General Tensors:** Transformation of co-ordinates and contravariant and covariant vectors. Transformation law for contravariant, covariant and mixed tensors. Kronecker Delta and permutation tensors. Algebra of general tensors. Quotient Law general tensors. Symmetric and anti-symmetric tensors. Metric Tensor. Reciprocal Tensors. Associated Tensors. Christoffel Symbols of first and second kind and their transformation laws.	21 lectures	April-May	Problems on General tensors, Chjristoffel symbols, Four vectors

Covariant derivative, gradient, divergence and curl of tensor fields. Minkowski Space, Four Vectors (four-displacement, four-velocity, four-momentum, four-vector potential, four- current density,). Tensorial form of Lorentz Transformation.			