ADVANCE PHYSICS 4(MATHEMATICAL METHOD OF PHYSICS-2)

PRE-REQUISITE: Mathematical Method of Physics I

INTRODUCTION: CREDITE HOURS: 4

A Course in Mathematical Methods for Physicists helps students understand the mathematical techniques needed for their future studies in physics. It provides an accessible account of most of the current, important mathematical tools required in physics these days. It is assumed that the reader has an adequate preparation in general physics and calculus. The course contents bridge the gap between an introductory physics course and more advanced courses in classical mechanics, electricity and magnetism, quantum mechanics, and thermal and statistical physics. It contains a large number of worked examples to illustrate the mathematical techniques developed and to show their relevance to physics.

COURSE OBJECTIVE:

To give the understanding of Differential equations and their uses in Physics, Introduction to special functions, Fourier series, Fourier Transforms, Solution of Boundary value problems and their uses.

TOPICS COVERED:

Green's Function:
Functions of Complex Variable:
Fourier Series and Transforms:

COURSE OUTLINE:

Green's Function:
Definition, Green's functions for the Strum-Liouville operator Green's functions in electrodynamics.
Functions of Complex Variable:
Complex functions, analyticity, Cauchy-Riemann equations, multivalued functions, Cauchy's integral formula, Taylor and Laurent series, the residue theorem and its applications.
Fourier Series and Transforms:
Fourier series and its complex form, applications of Fourier series, representations of a function, properties of Fourier transforms, Fourier integral theorem, Fourier sine and cosine transforms, applications of Fourier transforms, Laplace transform.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

REFERENCE BOOKS:

1. Mathematical Methods for Physics and Engineering, F. Riley, M. P. Hobson and S. J. Bence, Cambridge University Press, (1997).
2. Mathematical Physics by E. Butkov, Addison-Wesley Publishing Company, (1968).
3. Mathematical Methods for Physicists by G. Arfken and H. J. Weber, Academic Press, (1995).
4. Applied Mathematics for Engineers and Physicists by L.A. Pipes and L.R. Harvill, McGraw-Hill Book Company, (1970).
5. Mathematics of Classical and Quantum Physics Volume II, By F.W. Byron Jr. and R.W Fuller Addison-Wesley Publishing Company, (1970).
6. Complex Variable by M. R. Spiegel, Schaum Publishing Company, (1970)