

# In.M.Sc. Applied Physics, 5 years

## 6th Semester

<b>FPYC - 602: Mathematical Methods - II</b>	3 - 0 - 0	3
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### UNIT - I

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non - periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term - by - Term differentiation and integration of Fourier Series. Parseval Identity.

(10 Lectures)

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). (4 Lectures)

### UNIT - II

Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance, Frobenius method and its applications to differential equations: Legendre & Hermite Differential Equations. Properties of Legendre & Hermite Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Associated Legendre polynomials and spherical harmonics. (12 Lectures)

### UNIT - III

Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (4 Lectures)

### UNIT - IV

Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Conducting and dielectric sphere in an external uniform electric field. Wave equation and its solution for vibrational modes of a stretched string. (10 Lectures)

### Reference Books:

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw - Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. Differential Equations, George F. Simmons, 2006, Tata McGraw - Hill.
5. Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
6. Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books
7. Mathematical Physics and Special Relativity - - M. Das, P.K. Jena and B.K. Dash (Srikrishna Prakashan) 2nd Edition 2009

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8. Mathematical Physics - - H. K. Dass, Dr. Rama Verma (S. Chand Higher Academics) 6th Edition 2011.
9. Mathematical Physics –C. Harper, (Prentice Hall India) 2006.
10. Mathematical Physics - Goswami (CENGAGE Learning) 2014
11. Mathematical Method for Physical Sciences - - M. L. Boas (Wiley India) 2006
12. Mathematics for Physicists, P. Dennery and A. Krzywicki Dover)
13. Advanced Engineering Mathematics, E. Kreyszig (New Age Publication) 2011.