Fourth year of Five Years integrated M.Sc (Physics)
M.Sc. – IV, Semester – VII

		L	T	P	C
MP 407 :	**Computational Methods in Physics**	**3**	**2**	**0**	**5**

- **TWO POINT BOUNDARY VALUE PROBLEMS** **(06 Hours)**
  Introduction, Improved approximations and Numerov's method, wave eqn. with constant acceleration, Schrodinger's eqn. for spherical potentials and its algorithm for solution, Green'function

- **PARTIAL DIFFERENTIAL EQUATIONS** **(06 Hours)**
  Introduction, Diffusion equation, Laplace's and Poissson's equations, Wave equation in two dimensions

- **FOURIER ANALYSIS AND FOURIER TRANSFORM** **(10 Hours)**
  Fourier series of a periodic function, convergence theorem, completeness, boundary value problems, The fourier transform, convolution,FFT, DFT, applications

- **MONTE-CARLO METHODS** **(06 Hours)**
  Introduction, Use of Monte-Carlo method in Integrations, particle in a box, radio active decay, examples

- **MONTE-CARLO METHODS IN STATISTICAL PHYSICS** **(07 Hours)**
  Motivation, Review of statistical physics, Ising model and phase transitions

- **QUANTUM MONTE-CARLO METHODS** **(07 Hours)**
  Introduction, Variational Monte-Carlo method for quantum mechanical systems, VMC for atoms

(Total Contact Time (Theory) : 42 Hours)

BOOKS RECOMMENDED :

1.	**Giordano N.J., and Nakanishi H.**	*Computational Physics*	Pearson-Prentice-Hall	2005
2.	**Landau R.H., and Paez M.J.**	*Computational Physics*	Wiley	2007
3.	**Chapra S.G., and Canale R.P.**	*Numerical methods for Engineers*	McGraw Hill	2006
4.	**Artfen and Weber**	*Methamatical methods for Physicists*	Academic Press	2001
5.	**Tao Peng**	*An Introduction to Computational Physics*	Cambridge University Press	1997