Semester	**4**
Course	Skill I Physics Honors
Paper Code	S2PH230421P
Paper Title	**Computation Lab 3 : Numerical Modeling with Python**
No. of Credits	**3**
Theory / Practical / Composite	**Practical**
Minimum No. of preparatory hours per week a student has to devote	**3**
Number of Modules	**1**
Syllabus	1. Introduction to Numerical Modeling of Physical Problems using Python. 2. Solution of First and second order Ordinary Differential equations: Euler, modified Euler and Runge Kutta (RK) second and fourth order methods i. Radioactive decay ii. Classical equations of motion: 1 and 2 dimensional motion iii. Linear and Nonlinear Oscillators 3. Boundary Value Problems: Shooting Method 4. Partial differential equations: Relaxation and Finite Difference Method
Learning Outcomes	1. To understand the way to lay down a numerical scheme using different ODE solvers for solving Physics problems 2. To be able to execute different algorithms of ODE 3. To be able to understand and evaluate the effectiveness of an algorithm for a particular problem 4. To understand and execute PDE solving algorithms for different physical areas.
Reading/Reference Lists	1. Computational Physics: Problem Solving with Python, Rubin H. Landau, Manuel J Paez, Christian C. Bordeianu, Wiley-CH (2015) 2. Computational Physics, Nicholas Giordano, Hisao Nakanishi, Pearson-Addison Wesley (2005) 3. Online Refs: Langtangen, Kong et al, https://hplgit.github.io/primer.html/doc/pub/half/book.pdf 4. Programming for Computations - Python: A Gentle Introduction to Numerical Simulations with Python (Texts in Computational Science and Engineering Book 15) by Svein Linge and Hans Petter Langtangen, Springer 5. From Calculus to Chaos: An Introduction to Dynamics, David Acheson, OUP
Evaluation	CA: 48 Attendance: 2

	5. Dalgaard, P : Introductory Statistics with R, Springer Publications, 2nd Edition, 2008. 6. Maindonald, J. & Braun, J. : Data Analysis and Graphics Using R , Cambridge University Press, Cambridge, 2nd Edition, 2007. 7. Faraway, J. J. : Linear Models with R ,Chapman &Hall/CRC Texts in Statistical Science.
Evaluation	CA: Module – I: 30 Module – II: 20 End Sem: NA