B. Tech. I (All branches)	**L**	**T**	**P**	**C**
PH 102 S1: Mechanics, Lasers and Fiber Optics	**3**	**0**	**2**	**4**

- **CLASSICAL MECHANICS** (10 hours)

  Constraints, Generalised Coordinates, Velocities and momenta, D'Alembert's Principle, Lagrange's equation of motion, Planet orbits, Virial theorem, Calculus of variations, Variational technique for many independent variables, Hamilton principle, Hamilton's canonical equation of motion, Physical significance of H, Advantage of Hamilton approach.

- **QUANTUM MECHANICS** (10 hours)

  Inadequacy of classical mechanics (black body radiation, photoelectric effect), Wave and particle duality of radiation, de Broglie concept of matter waves, Electron diffraction, Heisenberg's uncertainty principle, Schrodinger's wave equation, Eigenvalues and eigenfunctions, Superposition principle, Interpretation of wave function, Particle confined in one dimensional infinite potential box.

- **ELECTRODYNAMICS** (06 hours)

  Electromagnetic waves, Maxwell's equations in vacuum & medium, Types of polarization, Internal field and Claussius-Mosotti equation.

- **LASERS** (08 hours)

  Introduction to Laser, Characteristics of Lasers, Spontaneous and stimulated emissions, Einstein's coefficients, Population inversion and lasing action, Laser systems: Ruby laser, He-Ne Laser, Semiconductor Laser, Advanced lasers, Holography.

- **FIBER OPTICS** (08 hours)

  Fermat's principle and Snell's law-optical fiber, Principle and construction, Acceptance cone, Numerical aperture, V-Number, Types of fibers, Fabrication: Double Crucible Technique, Vapour phase Oxidation Process, Fiber optic communication principle, Fiber optic sensors, Other applications of optical fibers.

Total Contact Time: 42 Hours

BOOKS RECOMMENDED:

Text Books:

1.	**R. Resnick and D. Halliday**	Physics (Part I & II)	Wiley	2007
2.	**A. Beiser**	Concept of the Modern Physics	McGraw-Hill	2008
3.	**Landau and Lipschitz**	Mechanics	Butterworth-Heinemann	1982

Reference Books:

1.	**D. J. Griffiths**	Introduction to Electrodynamics	Addison-Wesley	2012
2	**W. T. Silfvast**	Laser Fundamentals	Cambridge	2004