Course No.	Title of the Course	Course Structure	Pre-Requisite
FCPH004	Physics	3L-0T-2P	None

COURSE OUTCOMESS (CO):

1. Knowing important concepts and phenomena linked to relativity
2. The concept of waves and oscillations are useful for doing analytical and numerical calculations for measurements, observations and gravitational wave communications.
3. The course is helpful to the students in understanding various optical wave phenomena which are required for optical & electromagnetic wave communications and in optical devices.
4. To develop the basic understanding of laser for gaining advance knowledge in the field of optical communication and opto-electronics.
5. The Concepts of Optical Fiber for modern developments in physics which are helpful in designing and developing new devices used in optical communications, medicine, environment, Industries and related physics.

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	2	2	1	-	-	-	-	-	-
CO 2	3	2	2	2	2	1	-	-	-	-	-	-
CO 3	3	2	2	2	2	1	-	-	-	-	-	-
CO 4	3	2	2	2	2	1	-	-	-	-	-	-
CO 5	3	2	2	2	2	1	3	-	-	-	-	-

COURSE CONTENT:

UNIT-I
Relativity: Special Relativity, Lorentz Transformations, Velocity addition, Time dilation, Length Contraction, Variation of mass with velocity, Mass and energy, Relativistic momentum and relativistic energy, General theory of relativity, Einstein's theory of Gravitation, Gravitational waves, Gravity and Light.

UNIT-II
Oscillations and Waves: Damped and forced oscillations, Sharpness of resonance, Q-factor, Application in resonance, Acoustic waves, Pressure wave equations, Intensity pressure relation, Acoustic impedance, Reflection and transmission of acoustic waves, Impedance matching; Ultrasonics and its applications.

UNIT-III
Optics: Interference: Interference due to thin films, Newton's rings, and determination of the wavelength of sodium light, Interference due to wedge shaped film. Diffraction: Fraunhofer diffraction due to single slit and N Slits, Plane transmission grating, Rayleigh criterion of resolution, Resolving power of a grating, Polarization: Polarization in light, Birefringence, Nicol prism, Quarter and half wave plates, Production and analysis of plane, Circularly and elliptically polarized light,

Optical rotation, specific rotation, Polarimeter.

UNIT-IV
Lasers: Absorption and emission of radiation, Main features of a laser, Spatial and temporal coherence, Einstein Coefficients, condition for light amplification, Basic requirement for Laser, Population Inversion - Threshold Condition, Line shape function, Optical Resonators, Three level and four level systems. Classification of Lasers: Solid State Laser-Ruby laser and Gas Laser- He-Ne laser (Principle, Construction and working), Optical properties of semiconductor, Semiconductor laser (Principle, Construction and working), Applications of lasers in the field of medicine, Industry, Environment and Communication.

UNIT-V
Fibre Optics: Need for fiber Optic Communication, Physical nature of Optical fiber, Theory of Light propagation in optical fiber, Acceptance angle and numerical aperture, Step index and graded index fibers, Single mode and multimode fibers, Losses in optical fiber, Optical Fiber cables and bundles, Dispersion in optical fibers: Intermodal and Intramodal dispersion.

List of Experiments:
1. To determine the value of "g" by Bar Pendulum and find the radius of gyration
2. To determine the wavelength of He-Ne laser.
3. To find the numerical aperture and angle of acceptance of optical fiber.
4. To find the resolving power of a telescope.
5. To find the wavelength of sodium light by Newton's ring.
6. To find the wavelength of sodium light by Biprism.
7. To find the wavelength of Mercury green line by diffraction grating using spectrometer.
8. To find the focal length of combination of two lenses by Nodal slide assembly and verify the formula.
9. To find the specific rotation of canesugar by polarimrter.
10. To find the dispersive power of prism material using spectrometer.

Text Books:
T1 Arthur Beiser, Shobhit Mahajan, `` Concepts of Modern Physics," Mc-Graw Hill
T2 D S Mathur, ``Mechanics," S Chand & co.
T3 N. Subramaniam and Brij Lal, ``A Text Book of Optics," S Chand &Co.
T4 A K Jha "A Text Book of Applied Physics, Volume-1" I.K. International Publishing House.
T5 Indu Prakash, ``A Text Book of Practical Physics, Volume-1," Kitab Mahal Publication.
Reference:
R1 Serwey, Moses, Moyer, ``Modern Physics," Cengage Learning
R2 Jenkins and White, ``Fundamentals of Optics," McGraw Hill
R3 Ajay Ghatak "Optics" McGraw Hill