Department of Physics PH101 Engineering Physics

L-T-P-Cr: 3-1-0-4

Syllabus:

Unit 1. Electrostatic and Electromagnetic theory: The three electric vectors, to show that normal component of D and tangential component of E are continuous across the boundary between two dielectrics Continuity equation for charge (SAD .5.8), displacement current (SAD 9.4), Maxwell’s Equation in free space, speed of plane electromagnetic waves traveling in vacuum, pointing vector, (SAD 9.5, 10.3-10.5, 10.7), EM waves propagation in dialectics and conductors.

 Unit 2. Optics: Temporal coherence, Michelson’s interferometer for measurement of coherence length of a source, line width spatial coherence, measurement of spatial coherence using Young’s interferometer, Fraunhofer diffraction by single slit and grating.

Unit 3. Polarisation: Polarised light, production of plane polaroid technique (principal of action to be emphasised Brewster’s law, Malus law, Double refraction, production of circular and elliptical lights, analysis of unpolalrised and polarized lights, Magnetooptics effect, photo-elastic effect, electro-optic effect.

Unit 4. Lasers: Lasers and Laser light, Einstein’s A and B coefficients and the laser, population-inversion, Light amplification, Optical resonators, Characteristics of lasers, Ruby laser, How He-Ne Laser works.

Unit 5. Special theory of Relativity: Michelson – Morley’s Expt., Postulates of special theory of relativity, consequences of special theory of relativity, Galilean transformation, Lorenz transformation, Length- contraction. Time Dilation, velocity addition, Mass change and Einstein’s mass – energy relation (A.B & 1.1,1.2,1.4 & 1.7-1.9 and appendix to chapter-1)

Unit 6. Quantum Physics: Planck’s theory of black body radiation (.B & 2.3 & 9.5 &9.6) Compton effect (.B & 2.7) wave particle duality, deBroglie waves, deBroglie wave velocity, wave and group velocity, Davission and Germar experiment Heisenberg uncertainty principle, application of the uncertainty principle, wave functions and wave equations, physical interpretation of wave function and their normalization,. Expectation values, Schrodinger equation time dependent form and steady state form in one dimension (Quantum mechanical operators) particle in a box.

Recommended Readings: 1. D. J. Griffith, Introduction to Electromagnetic Theory, 2. A. Ghatak, Optics, 3. A. Beiser, Prospective of Modern Physics,