Department of Physics- Course Plan: Physics-I

Units	Topics	Time (hour)	Teaching Method	Resources
Unit 1: **Theory of Relativity**	Galilean relativity and transformation equations	1	Class Room	A.Beiser
	Newton's laws, invariants and numerical problems	1	Class Room	Resnick
	Doppler effect and road safety		**Self Studies**	A.Besiser
	Mass spring and EM wave equation in Galilean relativity		**Assignments**	Resnick
	Ether and Michelson-Morley experiment	1	Class Room	Resnick
	Analysis of MM experiment and validity of Galileo Relativity		**Assignments**	Resnick
	Einstein relativity and Lorentz transformation equations (LT)	1	Class Room	A.Beiser
	Lorentz invariance of EM wave equation and numerical problems		**Assignments**	Resnick
	Consequences of LT: Simultaneity of events, length contraction, time dilation, and addition of velocities		**Self Studies**	A. Beiser, & Internet
	Variation of mass and energy-momentum relation	1	Class Room	A.Beiser
	Mass energy conversion	1	Class Room	A.Beiser
	Nuclear power generation in Reactor	1	Class Room	Resnick
	Ethical use of nuclear power in society for sustainable development		**Assignments**	Internet
	Functioning of GPS and navigation	1	Class Room	A.Beiser
	Total hours	**8**		
Unit 2: **Quantum Mechanics**	Inadequacy of classical mechanics and Planck's quantum theory	1	Class Room	A.Beiser
	Photoelectric effect and functioning of digit camera		**Self-Study**	A.Beiser
	Compton effect	1	Class Room	A.Beiser
	De-Broglie's hypothesis and analysis of Davison-Germer experiment	1	Class Room	A.Beiser
	Wave-Particle duality and functioning of scanning electron microscope		**Assignments**	A.Beiser
	Uncertainty principle, non-existence of electron in nucleus, lifetime of excited state of atom	1	Class Room	A.Beiser
	Wave function, normalization, probability	1	Class Room	A.Beiser
	Problems on normalization and probability		**Assignments**	A.Beiser
	Schrödinger equation and its solution	1	Class Room	A.Beiser
	Particle in a box,	1.5	Class Room	A.Beiser
	Tunneling effect	1.5	Class Room	A.Beiser
	Functioning of tunnelling electron microscope		**Self-Study**	A.Beiser
	Idea of spin and qubit	1	**Class Room**	Internet
	Superposition, entanglement,	1	Class Room	Internet
	quantum information and computation.	1	Class Room	Internet
	Total hours	**12**		

Unit 3: **Wave Optics**	Interference in thin films	1	Class Room	A.Ghatak
	Functioning of anti-reflection coating in solar cell and sun glasses		**Assignments**	A.Ghatak , Internet
	Reflection by periodic structures	1	Class Room	A.Ghatak
	Multilayer coating and Fiber Bragg Grating		**Self Studies**	A.Ghatak
	Newton's rings experiment	1	Class Room	A.Ghatak
	Refractive index determination, optical testing of surfaces,		**Assignments**	A.Ghatak , Internet
	Diffraction at single slit	1	Class Room	A.Ghatak
	Diffraction grating	1	Class Room	A.Ghatak
	Functioning of XRD device	1	Class Room	A.Ghatak
	Resolving Power of grating		**Self studies**	A.Ghatak
	Interference filters		**Assignment**	A.Ghatak
	Polarized light and its production	1	Class Room	A.Ghatak
	Nicol prism as polarizer		**Self Studies**	A.Ghatak
	Analysis of polarized light	1	Class Room	A.Ghatak
	Nicol prism as analyzer		**Assignment**	A.Ghatak
	Polarized light and display technology		**Assignment**	A.Ghatak
	Total hours	**8**		
Unit 4: Advanced Materials	Dielectric polarization, polar and non-polar dielectrics, susceptibility	1	Class Room	Puri, Babar
	Local field, dielectric constant and polarizability	1	Class Room	Puri, Babar
	Sources of polarizability in solids and liquids		**Self studies**	Puri, Babar
	Ferroelectrics and piezoelectrics	1	Class Room	Puri, Babar
	Dielectrics in ac field,	1	Class Room	S. Pillai
	Dielectric loss and dielectric breakdown	1	Class Room	S. Pillai
	Functioning of super capacitor and LCR meter		**Assignments**	Internet
	Electromagnet and permanent magnetic materials		**Self Study**	internet
	Ferro magnetic material and spontaneous magnetization	1	Class Room	S.Pillai
	Hysteresis, domain theory, hard and soft magnetic materials	1	Class Room	S.Pillai
	Antiferro and ferrimagnetic materials	1	Class Room	S. Pillai
	Vibrating sample magnetometer		**Assignment**	Internet
	Superconductors, critical magnetic field and temp	1	Class Room	Puri, Babar
	Meissner effect, type-I and II superconductors,	1	Class Room	Puri, Babar
	Thermal, optical and tunnelling properties	1	Class Room	Puri, Babar
	Functioning of SQUIDs		**Self study**	internet
	BCS theory	1	Class Room	Puri, Babar
	Functioning of maglev train, MRI machine.		**Assignments**	internet
	Total hours	**12**		

Academic Convener HOD & Chairperson DAC