Department of Physics- Course Plan: Physics-II

Units	Topics	Time / hour	Teaching Method	Resources
Units 1: Theory of Semicon ductors	Crystal structure and Bravais lattice	1	Class Room	Puri, Babar
	Unit cell characteristics		**Self Study**	Puri Babar
	Miller indices, inter planar spacing	1	Class Room	Puri Babar
	Reciprocal lattice space	1	Class Room	Puri babar
	Crystal structure determination via XRD		**Assignments**	S. Pillai
	Periodic potential and K-P model	1	Class Room	Puri Babar
	Bands in semiconductor (SC) and effective mass	1	Class Room	Puri Babar
	Density of states and electron concentration in conduction band	1	Class Room	Puri Babar
	Holes in valence band and Fermi level in intrinsic SC		**Sef-Study**	Puri Babar
	Doping and Fermi level in extrinsic SC	1	Class Room	Puri Babar
	Conductivity and mobility of SC	1	Class Room	Puri Babar
	Law of mass action and charge neutrality condition in doped SC	1	Class Room	Puri Babar
	Band gap and mobility determination by four probe technique		**Assignments**	internet
	Hall effect, magneto resistance and sensors	1	Class Room	S.Pillai
	Total hours	**10**		
Unit 2: Semicon ductor Devices	Diode characteristic and voltage regulator	1	Class Room	Rakshit
	LED and solar cell	1	Class Room	Rakshit
	Rectifiers, microwave generation and tunnel diodes		**Self-Study**	Rakshit
	Transistor design and its components	1	Class Room	Rakshit
	Mode of operation and transistor input and output characteristics study	1	Class Room	Rakshit
	Numericals on Transistor operation		**Assignments**	Rakshit
	Application of Transistor as switch and amplifiers	1	Class Room	Rakshit
	Application of Transistor as oscillators, Barkhausen condition	1	Class Room	Rakshit
	Design and characteristics of JFET	1	Class Room	Rakshit
	Evaluation of design and working of bipolar transistor and FET		**Assignments**	Rakshit
	Design and characteristics of MOSFET	1	Class Room	Rakshit
	Voltage gain, impedance of operational amplifiers	1	Class Room	Rakshit
	Operational amplifiers as inverting, non-inverting, and summing amplifiers	1	Class Room	Rakshit
	Total hours	**10**		

Units 3: Electro magneti c Waves	Gradient, divergence, curl and their significance	1	Class Room	Griffiths
	Line, surface, volume integrals and applications	1	Class Room	Griffiths
	Gauss divergence and Stoke theorems verification	1	Class Room	Griffiths
	Conceptual problems		**Assignments**	Griffiths
	Gauss's law, Ampere's law and Faraday's law		**Self Studies**	Griffiths
	Continuity equation, and Modified Ampere's law	1	Class Room	Griffiths
	Displacement current and its technological aspects	1	Class Room	Griffiths
	Maxwell's equations	1	Class Room	Griffiths
	Conceptual problems		**Assignments**	
	Wave propagation in free space and dielectric mediums	1	Class Room	Griffiths
	Poynting vector and power flow in free space,	1	Class Room	Griffiths
	Functioning of RFID and microwave heating	1	Class Room	Internet
	Wireless device radiation and health issues and mitigati Strategies	1	Class Room	internet
	Total hours	**10**		
Units 4: Laser and Fiber Optics	Coherence and characteristic of Laser	1	Class Room	Ghatak
	Stimulated emission and Einstein coefficients	1	Class Room	Ghatak
	Population inversion, pumping and laser emission	1	Class Room	Ghatak
	Population inversion in 2,3 and 4 energy levels		**Assignments**	Ghatak
	Ruby and He-Ne laser sources	1	Class Room	Ghatak
	Semiconductor lasers	1	Class Room	Ghatak
	Holography and security	1	Class Room	Ghatak
			Assignments	Ghatak
	Applications of laser in science, industry and safety		**Self Study**	Ghatak
	Structure, classification and advantages of Optical fibers	1	Class Room	Ghatak
	Internal reflection and Principle of light propagation in fiber		**Self Study**	Ghatak
	Numerical aperture and acceptance angle of a fibre	1	Class Room	Ghatak
	Attenuation and distortion in fibres and their mitigation	1	Class Room	Ghatak
	Optical communication systems	1	Class Room	Ghatak
	5G, Internet of Things (IoT) and Sustainable developmer		**Assignment**	internet
	Total hours	**10**		

Academic Convener

HOD & Chairperson DAC, Physics