

University of Mumbai			
CLASS: F.E (All Branches of Engineering)		Semester - I	
SUBJECT: Applied Physics I			
Periods per week 01 Period of 60 min.	Lecture	3	
	Practical	1	
	Tutorial		
		Hours	Marks
Evaluation System	Theory Examination	2	75
	Practical	--	--
	Oral Examination	--	--
	Term Work	-	25
	Total		100

Details of the Syllabus:-

Sr. No.	Details	Hrs
01	Crystallography & X-rays: <ul style="list-style-type: none"> ➤ Lattice, basis, crystal axes, unit cells, lattice parameters & crystal systems, SC, BCC, FCC, diamond, NaCl, zinc blend and HCP crystal structures, Miller indices, planes & directions, Liquid crystals & phases, LCD display & its specifications. ➤ X-rays – origin of x-rays and x-ray spectra, x-ray diffraction & Bragg's law and determination of crystal structure. ➤ Real crystals – crystal imperfections, point defects and dislocations. 	12
02	Physics of Semiconductors: <ul style="list-style-type: none"> ➤ Classification of solids, Fermi-Dirac statistics, concept of Fermi level & its variation with temperature, impurity and applied voltage. ➤ Intrinsic & extrinsic carrier concentrations, carrier drift, mobility, resistivity and Hall effect, carrier diffusion, Einstein's relations, current density & continuity equations. ➤ Energy band diagrams of p-n junction, formation of depletion region, derivation for depletion layer width. 	08
03	Super conductivity: <ul style="list-style-type: none"> ➤ Critical temperature, Critical magnetic field, Type I Type II super conductors, high T_c super conductors. ➤ Meissner effect, Josephson effect. ➤ SQUIDS, plasma confinement, Maglev. 	05

04	Acoustics: <ul style="list-style-type: none"> ➤ Acoustics of Building, Absorption, Importance of Reverberation Time, Units of Loudness, Decibel, Phon. ➤ Conditions for Good Acoustics methods of Designs for Good Acoustics, Determination of Absorption coefficient, Noise Pollution. 	05
05	Ultrasonics: <ul style="list-style-type: none"> ➤ Principles of production, piezoelectric & magnetostriction effect. ➤ Piezoelectric & magnetostriction oscillator, ultrasonic materials – quartz & ferroelectric materials, cavitation effect. ➤ Applications based on cavitation effect and echo sounding, ultrasonic imaging & medical diagnosis. 	05
06	Electron optics: <ul style="list-style-type: none"> ➤ Electrostatic & Magnetostatic focusing system ➤ Construction & working of CRT, CRO and its applications. 	05

Term work:

Each student is to appear for at least one written test during the term. Term work shall consist of graded answer paper and at least five experiments from following:

Suggested Experiments	Applied Physics I:
	1) PF of SC, BCC, FCC, Diamond and HCP (Zn) crystal structures.
	2) Crystal lattice planes, Miller indices and interplanar spacing of (100), (110) and (111) set of planes in SC, BCC and FCC.
	3) Hall effect & determination of Hall coefficient.
	4) I-V characteristics of Si and GaAs diodes. (IR LED).
	5) CRO – measurement of frequency & amplitude.
	6) CRO – Lissa Jous patterns and measurement of phase difference.
	7) Ultrasonic distance meter.
	8) Measurement of wavelength & velocity of ultrasonic waves.

The distribution of term work marks shall be as follows:

Written test (at least one):	10 marks
Lab Work:	10 marks
Attendance	05 marks

Recommended Books:

1. Solid State Physics – Charles Kittel, Wiley Pbl
2. Physics of Semiconductors – S. M. Sze, Wiley Eastern
3. Engineering Physics – Gaur & Gupta, Dhanpat Rai & Co.
4. A Textbook of Engineering Physics – Kshirsagar & Avadhanulu, S Chand.
5. Modern Engineering Physics – Vasudeva S Chand Pbl.
6. Concepts of Modern Physics – Arthur Beiser, Tata Mcgraw Hill.