

University of Mumbai			
CLASS: F.E (All Branches of Engineering)		Semester – II	
SUBJECT: Applied Physics II			
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
Module-01	<p>Optics:</p> <ul style="list-style-type: none"> ➤ Interference in thin films, wedge shaped films and Newton's rings, applications of interference. ➤ Fraunhofer diffraction through double slit and diffraction grating, grating spectra, resolving power of grating. ➤ Total internal reflection, materials & types of optical fibres, numerical aperture, modes of propagation. V-number, attenuation, dispersion & other losses in fibres, applications. 	12
Module-02	<p>LASERS:</p> <ul style="list-style-type: none"> ➤ Absorption, spontaneous & stimulated emission, population inversion, metastable state, pumping schemes, active medium, resonant cavity, derivation for Einstein's coefficients. ➤ He-Ne laser, Nd: YAG laser, semiconductor diode laser, introduction to molecular and tuneable lasers. ➤ Application of lasers to holography, Memory reading and writing & other applications. 	08
Module-03	<p>Foundations of Quantum mechanics:</p> <ul style="list-style-type: none"> ➤ De'Broglie's hypothesis, group & phase velocity, wave packet, uncertainty principle & its applications. ➤ Wave function and probabilistic interpretation, one- dimensional time dependent Schrodinger equation, reduction to time independent form, application to free particle and particle in a box. ➤ Introduction to quantum computing. 	06

Module-04	Magnetic Materials & circuits: <ul style="list-style-type: none"> ➤ Atomic origin of magnetization, magnetic moment of atom, diamagnetism, Langevin's theory of paramagnetism and Curie's law, Weiss' theory of ferromagnetism. ➤ Magnetic circuits, magnetomotive force, reluctance, permeance, Ohm's law for magnetic circuit, relation between mmf & "H", magnetic circuit due to solenoid, Hysteresis. ➤ Ferrites, soft and hard magnetic materials and their applications. 	06
Module-05	Bio-Physics: <ul style="list-style-type: none"> ➤ Introduction and scope- molecular modeling, energy transfer & energy cycles, biomechanics, neurobiophysics. ➤ Tools - spectroscopy – UV/ visible , IR, use of NMR, Microscopy – SEM, STM and AFM. 	04
Module-06	Vacuum technology: <ul style="list-style-type: none"> ➤ Basic definitions, units, low, high and ultrahigh vacuum, methods of production. ➤ Vacuum pumps – rotary, diffusion, vacuum gauges – pirani, penning, thermocouple. ➤ Application to thin films , microelectronics, nanotechnology, plasma physics. 	04

Theory Examination :

1. Question paper will comprise of total 7 questions, each of 15 marks.
2. Only five questions need to be solved.
3. Question 1 will be compulsory and based on entire syllabus.
4. Remaining questions will be mixed in nature (for example suppose Q.2 has part (a) from module 3 then part (b) will be form any module other than module 3

In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term work:

Term work shall consist of minimum five experiments and a written test. The distribution of marks for term work shall be as follows:

Laboratory Work (Experiments and journal)	:	10 marks
test (at least one)	:	10 marks
Attendance (Practical and Theory)	:	05 marks
Total	:	25 marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and minimum passing in the TW.

Suggested Experiments	Applied Physics I:
	1) Newton's rings.
	2) Wedge-shaped film.
	3) Mercury spectrum using grating – determination of wavelengths.
	4) Determination of grating element with laser source.
	5) Divergence of Laser beam.
	6) Numerical Aperture of optical fibre.
	7) Optical fibre, attenuation coefficient.
	8) Determination of Planck's constant by photocell
	9) Hysteresis loop of magnetic materials.
	10) Study of basic low or high vacuum system.

Recommended Books:

1. Fundamentals of Physics, Holliday/ Resnick, Wiley India, 6th edi.
2. Fundamentals of optics-Keloms & White, Mcgraw-Hill Int.
3. Understanding Physics, Cummins, Wiley India.
4. Modern Engineering Physics – Vasudeva S Chand Pbl.
5. A Textbook of Engineering Physics – Kshirsagar & Avadhanulu, S Chand.
6. Quantum mechanics , Bransden & Jochain, Wiley Eastern.
7. Vacuum technology – A Roth.
8. Bio- Physics - Vasantha Pattabhi & N Gautham, Narosa Pbl.