SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

B.Sc. Degree

Syllabus for Allied Physics

2014 – 2015 onwards

FACULTY OF SCIENCE AND HUMANITIES

SRM UNIVERSITY

SRM NAGAR, KATTANKULATHUR – 603 203

COURSE CODE	COURSE TITLE	L	T	P	Total L+T+P	C
UPY14161	ALLIED PHYSICS - I	4	-	-	4	4

INSTRUCTIONAL OBJECTIVES	
1.	To understand the fundamentals of physics.
2.	To give the basic understanding of material properties.
3.	To educate and motivate the students in the field of science.
4.	To acquire knowledge on magnetism and dielectrics.

UNIT I - SIMPLE HARMONIC MOTION AND CIRCULAR MOTION

Time period - Amplitude - Phase - Spring mass system - Simple pendulum - Composition of two simple harmonic motions of equal periods in a straight line and at right angles - Lissajous figures - Damping force - Damped harmonic oscillator - Uniform circular motion - Acceleration of a particle in a circle - Centripetal and centrifugal forces - Banking on curved roads - Motion of a car around a circle.

UNIT II - PROPERTIES OF MATTER

Elasticity and plasticity - Elastic constants - Bending of beams - Young's modulus by non - Uniform bending - Torsion in a wire - Determination of rigidity modulus of torsion pendulum - Viscosity - Coefficient of viscosity - Poissuelle's formula - Stoke's law - terminal velocity - Surface tension - Molecular theory of surface tension - Excess pressure inside a drop and bubble.

UNIT III - HEAT AND THERMODYNAMICS

Kinetic theory of gases - Basic postulates - Ideal gas laws - Van Der Waal's equation of states - Pressure of an ideal gas - RMS speed - Laws of thermodynamics - Entropy - change of entropy in reversible and irreversible processes - Low temperature - Joule - Kelvin effect - Theory and applications - Liquefaction of gases - Linde's process - Adiabatic demagnetization.

UNIT IV - ELECTRICITY AND MAGNETISM

Electric charge - Conservation of charge - Permittivity - Coulomb's law - Electric field - Electric potential - Gauss's law and its applications - Conductors - Dielectrics - Electric Current - Ohm's law - Magnetic induction - Permeability - Susceptibility - Magnetic field due to a current carrying conductor - Biot Savart's law - Field along the axis of a coil - Force on a conductor carrying current in a magnetic field - Ampere's circuital law - Faraday's law – Gradient - Curl and Divergence - EM waves - Maxwell's equations in free space.

UNIT V – GEOMETRICAL OPTICS

Light and Optics - Fermat's principle - Laws of reflection and refraction - Total internal reflection and its illustrations - Mirrors and lenses - Lens formula - Combinations of thin lenses - Refraction through a prism - Combination of two prisms to produce dispersion without deviation and deviation without dispersion - Defects of images - Coma distortion - Spherical and chromatic aberration in lenses.

TEXT BOOKS

1. Resnick R. and Halliday D., *Fundamentals of Physics*, Wiley Publication, 8th Edition, 2011.
2. Sundaravelusamy A., *Allied Physics I*, Priya Publications, 2009.

REFERENCES

1. Naik P.V., *Principles of Physics,* PHI Learning Pvt. Ltd, 2006.
2. John Thiruvadigal D., Ponnusamy S., Sudha L. and Krishnamohan M., *Physics for Technologists,* Vibrant Publication, 2013.
3. Rajam J. B., *Physics for Technologists*, S. Chand, 1981.
4. Brijilal and Subramanian, *Elements of properties of matter*, S. Chand Limited, 1974.
5. Zemansky M. W. and Ditlman R.H., *Heat and Thermodynamics*, Tata Mcgraw Hill, 2011.

COURSE CODE	COURSE TITLE	L	T	P	Total L+T+P	C
UPY14261	ALLIED PHYSICS – II	4	-	-	4	4

INSTRUCTIONAL OBJECTIVES	
1.	To understand the fundamentals of physics.
2.	To emphasize the significance of Green technology and its applications.
3.	To understand the structural, optical, nuclear and electronic properties of solids.
4.	To acquire knowledge on elementary ideas of integrated circuits.

UNIT I - ENERGY PHYSICS

Sources of conventional energy - Need for non - Conventional energy – Resources - Solar energy - Solar cells and its applications - Wind energy - Generation and applications - Bio mass energy - Generation and applications - Geothermal energy - Generation - Applications - Tidal energy - Generation and applications - Hydro energy – Generation - Applications.

UNIT II - MODERN PHYSICS

Atomic structure - Alpha, beta and gamma radiation - Law of radioactive decay - Decay constant - Half life - Mean life - Nuclear energy - Mass defect - Binding energy - Fission and fusion - Biological effects of radiation - Black body radiation - Planck's quantum hypothesis - Photoelectric effect - Compton effect - De Broglie equation - Uncertainty principle.

UNIT III – WAVE AND FIBRE OPTICS

Wave nature of light - Huygens's principle - Interference - Young's double slit experiment - Coherence - Interference from thin films - Michelson's interferometer - Newton's rings. Diffraction - Wave theory of light - Single slit experiment - Diffraction grating - Polarization - Fiber optics - Propagation of light in optical fiber - Acceptance angle - Numerical aperture - Attenuation - Types of optical fibers and its Applications.

UNIT IV - CRYSTAL PHYSICS

Space lattice - Basis - Unit Cell - Lattice parameters - Two dimensional and three dimensional Bravais lattices and Crystal systems - Cubic crystal system - Crystal symmetry - Reciprocal lattice and its importance - Density and atomic packing fraction - Directions - Planes and Miller indices - Interplanar distance – NaCl - Zinc sulphide - Hexagonal Closely Packed (HCP) structure - Crystal imperfections - X ray diffraction - Laue method - Single crystal and powder diffraction.

UNIT V - ELECTRONICS

Basic Electronics - P and N type semiconductors - Junction Diode and their characteristics - Half wave - Full wave rectifiers - Voltage regulations - Zener diode - Junction transistor - PNP - Digital electronics - AND, OR, NOT gates - NAND and NOR as universal building Blocks - Boolean algebra - Laws of Boolean algebra – De Morgan's theorem - Their verification using truth table - Elementary ideas of integrated circuits (ICs).

TEXT BOOKS

1. Kittel C., *Introduction to Solid State Physics*, 8th Edition, Wiley Eastern Ltd, 2005.
2. Malvino and Leach, *Digital Principles & their applications*, Tata McGraw Hill, 2010.

REFERENCES

1. Jha A.K., *Textbook of Applied Physics,* International Publishing House Pvt. Ltd, 2011.
2. Mansi Karkare and Rajni Bahuguna, *Applied Physics*, Volume – II International Publishing House Pvt. Ltd, 2010.
3. Tasneem Abbasi, Abbasi S. A, *Renewable Energy Sources: Their Impact on Global Warming and Pollution*, PHI Learning Pvt. Ltd. 2013.
4. Thyagarajan K. and Ajay Ghatak, *Introduction to Fiber Optics*, Cambridge, University Press, 1998.
5. Grob B., McGraw *Basic Electronics*, 6th Edition, McGraw Hill, 2010.

COURSE CODE	COURSE TITLE	L	T	P	Total L+T+P	C
UPY14162	ALLIED PHYSICS LAB – I	-	-	4	4	2

INSTRUCTIONAL OBJECTIVES	
1.	To acquire basic understanding of laboratory techniques.
2.	To educate the basics of instrumentation, data acquisition and interpretation of results.
3.	To educate and motivate the students in the field of science.
4.	To allow the students to have a deep knowledge of fundamentals of optics.

LIST OF EXPERIMENTS

1. Determination of Young's Modulus - Uniform bending Method.
2. Determination of Young's Modulus - Non Uniform bending Method.
3. Determination of Rigidity Modulus of a wire – Torsional pendulum.
4. Determination of thermal conductivity of a bad conductor using Lee's disc method.
5. Calibration of Voltmeter using potentiometer.
6. Calibration of Ammeter using potentiometer.
7. Determination of magnetic susceptibility using Quincke's Method.
8. Determination of dispersive power of a prism using spectrometer.
9. Determination of Cauchy's constant using spectrometer.

TEXT BOOKS

1. Bernard C.H. and Epp C.D., John, *Laboratory Experiments in College Physics* Wiley and Sons, Inc., 1995.
2. Srinivasan M.N., *A Textbook of Practical Physics*, Sultan Chand & Sons, 1994.

REFERENCES

1. Squires G. L., *Practical Physics*, 4th Edition, Cambridge University Press, 2001.
2. Geeta Sanon, B. Sc., *Practical Physics, 1st Edition*, S. Chand & Co, 2007.
3. Benenson Walter, and Horst Stöcker, *Handbook of Physics, S*pringer, 2002.
4. Chattopadhyay, Rakshit and Saha, *An Advanced Course in Practical Physics*, 8th Edition, Books & Allied Ltd., 2007.
5. Indu Prakash and Ramakrishna, *A Text Book of Practical Physics*, 11th Edition, Kitab Mahal, 2011.

COURSE CODE	COURSE TITLE	L	T	P	Total L+T+P	C
UPY14262	ALLIED PHYSICS LAB – II	-	-	4	4	2

INSTRUCTIONAL OBJECTIVES	
1.	To familiarize with the concept of material properties.
2.	To educate the basics of instrumentation, data acquisition and analysis.
3.	To understand the optical and electronic properties of solids through experimentations.
4.	To enhance the students to understand the concepts in integrated chips.

LIST OF EXPERIMENTS

1. Study the I-V Characteristic of a Solar Cell.
2. Determination of wire thickness using air wedge experiment.
3. Study of attenuation and propagation characteristics of optical fiber cable.
4. Band gap determination using Post Office Box – Specific resistance.
5. Dielectric constant Measurement.
6. Hall effect-Hall coefficient determination.
7. Construction of AND, OR, NOT gates using diodes, resistors and Transistors.
8. NAND gate as a Universal gate.
9. Determination of regulation properties of a given power supply using an integrated circuit (IC).

TEXT BOOKS

1. Arora C. L., *B.Sc., Practical Physics,* S. Chand & Company Ltd, 2007.
2. Robert Andrews Millikan, Henry Gordon Gale, *Practical Physics*, Nabu Press, 2012.

REFERENCES

1. Ouseph C., K.Rangarajan *A, Text Book of Practical Physics*, Volume I,II, S.Viswanathan Publishers,1997.
2. Chauhan and Singh, *Advanced Practical Physics*, Revised Edition, Pragati Prakashan, 1985.
3. Geeta Sanon, B. Sc., *Practical Physics, 1st Edition,S*. Chand & Co, 2007.
4. Shukla R. K. & Anchal Srivastava, *Practical Physics*, New Age International (P) Ltd, Publishers, 2006.
5. Thiruvadigal J. D., Ponnusamy S. and Vasuhi P. S., *Materials Science*, Vibrant Publications, 2012.