



## SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f) & 12(B) Status under UGC Act of 1956]

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## DEGREE OF BACHELOR OF SCIENCE IN PHYSICS

### CHOICE BASED CREDIT SYSTEM (CBCS)

## REGULATIONS AND SYLLABUS FOR

### B.Sc. PHYSICS PROGRAMME

#### (SEMESTER PATTERN)

(For Students Admitted in the College from the Academic Year 2021 - 2022 Onwards)



### Programme Outcomes (POs)

<b>PO1</b>	Understand basic principles and experimental basis about different branches of Physics and logical relationships of various fields.
<b>PO2</b>	Based on the gained knowledge, students can acquire technical, analytical, and creative skills.
<b>PO3</b>	Transfer and apply the acquired skills, concept, and principles to study different fields of Physics
<b>PO4</b>	Capable of solving problems using techniques with mathematical skills, conceptual and mathematical models.
<b>PO5</b>	Develop proficiency in the design and construction of portable devices using laboratory components/instruments and to draw valid conclusions from experimental data.

### Programme Specific Outcomes (PSOs)

<b>PSO1</b>	Acquire core knowledge in diverse areas of Physics, such as Properties of Matter and Acoustics, Space Physics, Heat and Thermodynamics, Electricity and Magnetism, Optics, Mechanics, Renewable Energy Sources, Digital Electronics, Nuclear Physics, Quantum Mechanics and Relativity, Solid State Physics, Microprocessors, Instrumentation, Communication Electronics, NanoScience, and Nano Technology and Spectroscopy.
<b>PSO2</b>	Expand the proficiency in the usage of a variety of laboratory devices and their demonstration.
<b>PSO3</b>	Gain laboratory skills that allow them to take measurements in a physical laboratory and interpret measurements to draw a logical conclusion.
<b>PSO4</b>	Develop constructive knowledge and communication skills at an international standard.
<b>PSO5</b>	Understand the impact of Physics and Science on society.
<b>PSO6</b>	Create Physics Principles in other fields such as Mathematics, Computer Science, Chemistry, etc.



## SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Bachelor of Science (B.Sc.) in Physics

Programme Pattern and Syllabus (CBCS)

(For Students Admitted in the College from the Academic Year 2021-2022 Onwards)

Sl. No.	Part	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
<b>SEMESTER I</b>									
1	I	Language	21UTA1F01	Tamil – I	5	3	25	75	100
2	II	Language	21UEN1CE01	Communicative English - I	5	3	25	75	100
3	III	Core – I	21UPH1C01	Properties of Matter and Sound	6	5	25	75	100
4		Core Practical – I Extended to Semester II	21UPH2P01	Practical – I	3	Credit and Marks are carried to Core Practical – I of Semester II			
5		Allied – I	21UMA1A01	Allied Mathematics - I	5	4	25	75	100
6	IV	Value Education	21UVE101	Manavalakalai - Yoga	2	2	25	75	100
7		Add on Course	21UPS1AO01	Professional English - I	4	4	25	75	100
<b>Total</b>					<b>30</b>	<b>21</b>	<b>150</b>	<b>450</b>	<b>600</b>
<b>SEMESTER II</b>									
8	I	Language	21UTA2F02	Tamil – II	5	3	25	75	100
9	II	Language	21UEN2CE02	Communicative English - II	4	3	25	75	100
10	III	Core – II	21UPH2C02	Mechanics	5	5	25	75	100
11		Core Practical – I Extended from Semester I	21UPH2P01	Practical – I	3	4	40	60	100
12		Allied – II	21UMA2A02	Allied Mathematics - II	5	4	25	75	100



13	IV	SBEC – I	21UPH2S01	Space Physics	2	2	25	75	100
14		Common Paper	21U2ES01	Environmental Studies	2	2	25	75	100
15		Add on Course	21UPS2AO02	Professional English – II	4	4	25	75	100
<b>Total</b>					<b>30</b>	<b>27</b>	<b>215</b>	<b>585</b>	<b>800</b>

**Note**

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

**List of Extension Activities**

1. National Cade Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)



# PROGRAMME SYLLABUS



Program: B.Sc. Physics				
Core – I		Course Code: 21UPH1C01		Course Title: Properties of Matter and Acoustics
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	6	90	5	100

### Course Objectives

1. To enlighten the basic concepts of modulus, viscosity, osmosis and acoustics.
2. To understand procedures involved in measuring bending, twisting motions, motion of liquid flow, diffusion process, Acoustics and its applications.
3. To acquire knowledge about properties of matter and acoustics.

### **UNIT – I: Elasticity**

Three Types of Elastic Moduli – Poisson's Ratio, Bending of Beams– Expression for Bending Moment – Cantilever–Depression of the Loaded End of a Cantilever, Expression for Young's Modulus - Uniform and Non–Uniform Bending – Pin and Microscope –Koenig's Method, Torsion of a Body – Expression for Couple Per Unit Twist — Determination of Rigidity Modulus by Torsion Pendulum with Mass, Determination of Rigidity Modulus – Static Torsion Method with Scale and Telescope.

### **UNIT – II: Viscosity**

Viscosity – Coefficient of critical velocity – Poiseulli's formula for coefficient of viscosity and its correction – Determination of coefficient of viscosity by capillary flow method – comparison of viscosities Oswald's viscometer – Viscosity of a highly viscous liquid – Stoke's method for the Coefficient of a highly viscous liquid – Variations of viscosity with temperature and pressure – Viscosity of gases – Mayer's formula for the rate of flow of a gas through a capillary tube – Rankine's method for the determination of viscosity of a gas

### **UNIT –III: Surface Tension**

Definition of Surface Tension with Unit and Dimension, Surface Energy –Formation of Drops– Angle of Contact, Excess of Pressure Inside Curved Surface, Experimental



Determination of Surface Tension (Jaeger's Method), Drop Weight Method of Determining Surface Tension and Interfacial Surface Tension, Quincke's Method

#### **UNIT – IV: Osmosis and Diffusion**

Definition– Graham's Laws of Diffusion in Liquids–Fick's Laws of Diffusion, Analogy with Heat Conduction– Experimental Determination of Coefficient of Diffusion (Diffusivity) Graham's Law of Diffusion of Gases–Effusion–Transpiration.

Osmosis: Definition– Experimental Determination of Osmotic Pressure, Laws of Osmosis– Osmotic Pressure and Vapour Pressure of a Solution.

#### **UNIT – V: Acoustics**

Theory of Vibrations: Simple Harmonic Motion, Undamped Vibration, Damped Vibration Forced Vibration, Resonance and Sharpness of Resonance. Determination of Absorption Coefficient - Ultrasonic– Production (Piezo Electric and Magnetostriction Method), Ultrasonic - Detection – Properties – Applications, Acoustics: Acoustics of Buildings – Factors affecting Acoustics of buildings - Reverberation Time, Sabine's Formula and its Applications.

#### **Text Books**

1. R. Murugesan, Properties of matter and acoustics, S. Chand & Co, New Delhi (2012).  
[Units Covered: 1-5; Pages: 1-5, 12 – 27, 32-40, 45-58, 62-67, 70-73, 76-79, 85 – 94, 102 – 105, 171- 181, 188- 201, 205 - 209 ]
2. Brijlal and N. Subramanyam, Properties of matter, Eurasia Publishing House Limited (2005). [Units Covered : 1-4, Pages: 183- 188, 194-199, 215-220, 226-229, 236-242, 250- 259, 273- 275, 289- 291, 298- 305, 310- 318, 324- 326, 328- 329]

#### **Reference Books**

1. N. Subramaniam and Brijlal, A Text Book of Sound, Vikas Publication House Pvt Ltd, New Delhi (1999).
2. D.S. Mathur, Elements of properties of matter, S. Chand & Company Ltd., New Delhi (2010).
3. Richard P. Feynman, Lectures on Physics. Vol. I & II, The New Millennium Edition (2012).
4. David Halliday and Robert Resnick, Fundamentals of Physics, Wiley Plus (2013).
5. B.H. Flowers and E. Mendoza, Properties of Matter, Wiley Plus, (1991).



6. H.R. Gulati, Fundamentals of General Properties of Matter, S. Chand & Co. Pvt. Ltd, (2012).
7. Hugh D. Young and Roger A. Freedman, Sears & Zemansky's University Physics with Modern Physics, 14<sup>th</sup> Edition (2015).

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of modulus, Surface Tension, Osmosis and Acoustics	K1 & K2
CO2	Gather knowledge about the measurement of modulus for different material, tension of different liquid, diffusion process and production, detection and applications of Ultrasonics	K2, K3 & K4
CO3	Able to gain knowledge in calculating the modulus values of different materials, difference in surface tension of liquids and vibrational motions.	K4 & K5
CO4	Gain knowledge regarding methods of production of Ultrasonic waves, process of diffusion and liquid motions.	K4, K5 & K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

### Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	S
CO2	M	M	S	S	S
CO3	S	S	S	S	M
CO4	S	S	M	S	S

S – Strong

M – Medium

L – Low





Program: B.Sc. Physics				
Core – II		Course Code: 21UPH2C02		Course Title: Mechanics
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	5	75	5	100

### Course Objectives

1. To introduce the students to the concepts of vectors, resolution of vectors and vector operators.
2. To provide an understanding of one dimensional and two dimensional motion of objects, impact of bodies and Rigid body dynamics. To understand procedures involved in accounting process and its applications.
3. To impart a knowledge of gravitation and related concepts.

#### **UNIT – I: Projectiles and Circular Motion**

Projectiles - Time of flight - Maximum height reached - Range of projectile - Path of projectile - Range of projectile up and down an inclined plane.

Circular Motion - Centripetal force - Centrifugal force - Angular velocity - Angular acceleration - Normal acceleration - Relation between linear and angular velocities - Motion of cyclist along a curved path - Banking of curve.

#### **UNIT – II: Impulse and Impact**

Impulse – Impact – Impulsive force – Laws of impact – Coefficient of restitution – Direct impact of a smooth sphere on a smooth horizontal plane – Direct impact of two smooth elastic spheres – loss of kinetic energy due to direct impact – Oblique impact of a smooth sphere on a smooth horizontal plane - Oblique impact of two smooth elastic spheres – Loss of kinetic energy due to oblique impact.

#### **UNIT – III: Dynamics of Rigid Bodies**

Rigid body – Moment of inertia – Radius of gyration – Kinetic energy of rotation – Parallel and perpendicular axes theorems – Theory of compound pendulum – Equivalent simple pendulum – Interchangeability of center of suspension and center of oscillation –



Determination of 'g' and radius of gyration of a bar pendulum – Bifilar pendulum (parallel threads).

#### **UNIT – IV: Center of Gravity and Center of Pressure**

Center of Gravity: Definition – Centre of gravity of a solid cone, Solid hemisphere, Hollow hemisphere and a tetrahedron.

Center of Pressure: Definition – Center of pressure of a rectangular lamina and triangular lamina.

#### **UNIT – V: Gravitation**

Newton's law of gravitation – Acceleration due to gravity – Variation of 'g' with altitude, depth and rotation of earth – Inertial mass and gravitational mass – Gravitational field – Gravitational field intensity – Gravitational potential difference – Gravitational potential – Gravitational potential energy – Gravitational potential energy near the surface of earth – Escape velocity – Orbital velocity – Weightlessness.

#### **Text Books**

1. R. Murugesan, Mechanics and Mathematical Physics, S.Chand & Company Ltd., New Delhi, 3<sup>rd</sup> Revised Edition (2008).  
[Unit Covered: 1 – 5: Pages:1 - 19, 20 - 28, 29 - 43].
2. M. Narayanamurthi and N. Nagarathinam, Dynamics, The National Publishing Company, 8<sup>th</sup> Edition (2008).  
[Unit Covered: 1 – 3: Pages: 34 - 42, 69 - 76, 181 - 211].
3. P. Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics, S. Chand & Company Ltd., New Delhi, 1<sup>st</sup> Edition (2009).  
[Unit Covered: 1 – 4, Pages:150 - 173, 260 - 284, 285 - 311].

#### **Reference Books**

1. D.S. Mathur, Mechanics, S.Chand & Company Ltd., New Delhi, Third Revised Edition (2000).
2. S.G. Venkatachalapathy, Mechanics, Margham Publication, (2012).
3. C. L. Arora, Refresher course in Physics for B.Sc. Classes (Vol-I), S. Chand Publishing, New Delhi, (1981).



4. Halliday, Resnick, Walker, Fundamentals of Physics, 8th Edition, John Wiley & Sons, New Delhi, (2009).

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge of analyzing the motion of objects using fundamental laws of Physics.	K1 & K2
CO2	Acquire a knowledge about Dynamics and Rigid bodies	K2
CO3	Understand gravitational potential energy	K2 & K4
CO4	Analyze the variation of acceleration due to gravity 'g'	K4
CO5	Solve simple problems involving the dynamic motions of objects.	K5 & K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

### Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	M	M	S	S	S
CO3	S	S	S	S	M
CO4	M	S	S	S	S
CO5	S	S	S	M	S

S – Strong

M – Medium

L – Low



Program: B.Sc. Physics				
SBEC – I	Course Code: 21UPH2S01		Course Title: Space Physics	
Semester II	Hours/Week 3	Total Hours 45	Credits 2	Total Marks 100

### Course Objectives

1. To introduce the students to the Basic Idea of Universe.
2. To provide an understanding of Planets, Stars and Comets.
3. To impart a knowledge of Sun and Steady State Theory.

#### **UNIT – I : Universe**

Solar system - Planets - Interior Planets - Exterior Planets-Crust, Mantle and Core of the Earth-Different - Region of Earth's Atmosphere-Rotation of the Earth – Magnetosphere-Van Allen Belts – Aurora.

#### **UNIT – II: Comets, Meteors, Asteroids**

Composition and Structure of Comets-Periodic Comets-Salient Features of Asteroids, Meteoroids, Meteorites, Meteors and its Use.

#### **UNIT – III: Sun**

Structure of Photosphere, Chromosphere-Corona – Magnetic field on the Sun- Sun spots – Solar Flares-Solar Prominences - Solar Piages-Satellites of Planets-Structure, Phases and their Features of Moon.

#### **UNIT – IV: Structure of Stars**

Constellations - Binary Stars-Origin and Types Star Clusters-Globular Clusters-Types of Variable Stars - Types of Galaxies.

#### **UNIT – V: Origin of Universe**

Big bang theory-Pulsating theory-Steady state theory-Composition of universe expansion.

**Text Books**

1. K.D. Abyankar, Astrophysics of the solar system, University press, India (1999).  
[Unit Covered:1 – 5: Pages: 1-10, 32 - 79, 142 - 175, 248 – 275, 395 - 420]

**BOOKS FOR REFERENCE:**

1. Baidyanath Basu, Sudhindra Nath Biswas and Tanuka Chattopadhyay, An Introduction to Astrophysics, Prentice Hall of India, New Delhi (2010).
2. P. Devadas, The fascinating Astronomy, Devadas Telescopes, Chennai (2001).
3. R.P. Singhal, Elements of Space Physics, PHI (2009).

**Course Outcomes (COs)**

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge of Universe.	K1 & K2
CO2	Acquire knowledge about Stars, Comets and Planets.	K2
CO3	Understand the Life Time Period of rotation of the Planets .	K2 & K4
CO4	Understanding the About Galaxies and Clusters	K4
CO5	Acquire Knowledge to Steady State Theory.	K5 & K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

**Mapping of COs with POs**

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	S
CO2	M	M	M	S	S
CO3	S	S	M	M	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

**S – Strong**

**M – Medium**

**L – Low**



Program: B.Sc. Physics				
Core Practical - I	Course Code: 21UPH2P01		Course Title : Core Practical - I	
Semester	Hours/Week	Total Hours	Credits	Total Marks
I & II	3	45	4	100

### Course Objectives

1. To expose the technique of handling simple measuring instruments and also measure certain optical, mechanical and thermal properties of matter.
2. To construct and verify various basic electronic circuits.

### **LIST OF EXPERIMENTS**

1. Young's Modulus – Non uniform bending – Scale and Telescope Method.
2. Young's Modulus – Uniform bending – Scale and Telescope Method.
3. Rigidity Modulus–Torsion Pendulum
4. Surface tension and interfacial surface tension – Drop Weight Method.
5. Sonometer – frequency of a tuning fork – Determination of mass of a stone.
6. Sonometer – A.C frequency.
8. Spectrometer – Solid Prism.
9. Spectrometer - Grating – Minimum Deviation Method - Measurement of Wavelength.
10. Current and Voltage sensitivities of a Galvanometer
11. P.O. Box – Temperature Coefficient of Resistance.
12. Joule's calorimeter – Specific heat capacity of a liquid – Barton's Correction
13. Specific heat capacity of a liquid – Method of Mixture.
14. M and  $B_H$ - Deflection Magnetometer - TAN A Position.
15. Potentiometer – Internal Resistance of the cell.
16. Potentiometer – Low Range Voltmeter.
17. Junction diode – Characteristics.
18. Zener diode – Characteristics.



19. Study of logic gates (AND, OR, NOT, NAND, NOR & EX-OR).
20. Low range power pack using two diodes.

### BOOKS FOR STUDY AND REFERENCE:

1. S. Balasubramanian, R. Ranganathan, M.N. Srinivasan, A Text book of Physics Practical, 2<sup>nd</sup> Revised Edition, S. Chand & Sons (2017).
2. C. C. Ouseph, U.J. Rao, V. Vijayendiran, Practical Physics, 1<sup>st</sup> Edition, Viswanathan.S Printers and Publishers Private Ltd. (2015).
3. P. R. Sasi Kumar, Practical Physics, PHI (2014).
4. S. P. Singh, Advanced Practical Physics, Pragathi Prakasam (2017).
5. C. L Arora, Practical Physics, S. Chand & Co (2010).
6. Geeta Sanon, B.Sc Practical Physics, 1<sup>st</sup> Edition, Chand & Co., New Delhi (2007).
7. K. A. Navas, Electronics Lab Manual, Volume I, PHI, 5<sup>th</sup> Edition (2015).

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Perform experiments on material to identify the strength the given objects	K1
CO2	Deal with liquids based on their Surface tension	K2
CO3	Learn the relation between frequency, length and tension of a stretched string under vibration	K2 & K3
CO4	Acquire knowledge of magnetic dipole moment of a bar magnet using a deflection magnetometer by Tan A position	K4
CO5	Analyse the input and output characteristics of various electronic devices	K5 & K6
CO6	Examine the performance of logic gates using IC's and discrete components and to measure the output	K5 & K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**



**Mapping of COs with POs**

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	S	S	S	S
CO3	M	S	S	S	S
CO4	S	S	S	S	S
CO5	S	M	S	S	S

**S – Strong**

**M – Medium**

**L – Low**





# **ALLIED PHYSICS (THEORY AND PRACTICALS)**



Program: B.Sc. Physics				
<b>Allied - I</b> <b>B.Sc Maths/ B.Sc Chemistry</b>		<b>Course Code:</b> 21UPH1A01 - Mathematics 21UPH3A01 - Chemistry		<b>Course Title : Allied</b> <b>Physics-I</b>
<b>Semester</b> I / III	<b>Hours/Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 4	<b>Total Marks</b> 100

### Course Objectives

1. To study the basics of Properties of Matter
2. To study the propagation of sound waves, the production of ultrasonic waves and its applications.
3. To impart a knowledge of heat radiation and sound.
4. To provide an understanding of Gravitation and Electricity.

### **UNIT – I: Properties of Matter**

Elasticity: Stress – strain diagram – Hooke’s law – work done in stretching a wire – elastic constants – Bending of beams – Expression for bending moment –Expression for Young's modulus (uniform and non–uniform bending) – Torsion of a body – Expression for couple per unit twist – Determination of rigidity modulus of a wire by torsional pendulum – drop weight method of determining surface tension and interfacial surface tension..

### **UNIT – II: Sound and Ultrasonics**

Sound: Longitudinal waves and transverse waves – Laws of transverse vibrations of strings – Sonometer – Verification of laws of transverse vibrations of Strings – Determination of AC frequency.

Ultrasonics: Introduction to ultrasonics – Piezo electric effect– Production by piezo electric method – Properties – Applications– Acoustics: Acoustics of buildings – Reverberation time – Derivation of Sabine's formula – Determination of absorption coefficient

**UNIT – III: Heat**

Vander Waal's equation of state–critical constants–determination of critical constants – Joule– Kelvin effect – Porous plug experiment – Temperature inversion–coefficient of thermal conductivity – Determination of coefficient of thermal conductivity of bad conductor by Lee's disc method.

**UNIT – IV: Gravitation**

Newton's law of gravitation – inertial mass – gravitational mass – Kepler's laws of planetary motion – deduction of Newton's law of gravitation from Kepler's law – determination of G by Boy's experiment – variation of g with altitude – variation of g with depth.

**UNIT – V: Electricity**

Electric circuit – open circuit–closed circuit - resistors, capacitors and inductors – series and parallel combinations of capacitors – Carey foster's bridge – theory – measurement of resistance – potentiometer – calibration of low range voltmeter – measurement of high resistance by leakage.

**BOOKS FOR STUDY:**

1. R. Murugesan, Properties of matter and acoustics, S. Chand & Co, New Delhi (2012).  
[Unit covered: 1 and 4: Pages: 1 - 97,113 - 135]
2. N.Subrahmaniyam Brijlal, Sound, S. Chand & Co (2004).  
[Unit covered: 2: Pages:146 - 148,237 - 248,260 - 264]
3. Brijlal & Dr.N.Subramanyam and P.S. Hemne, Heat and Thermodynamics, S. Chand & Co, New Delhi (2004).  
[Unit Covered: 3: Pages: 194 - 199, 203 - 206, 361 - 367]
4. R. Murugesan, Electricity and magnetism S. Chand & Co, New Delhi (2014).  
[Unit Covered: 5: Pages: 97 - 101]

**BOOK FOR REFERENCE:**

1. D.S. Mathur, Elements of properties of matter, S.Chand & Company Ltd., New Delhi (2010).
2. R. Murugesan, Modern Physics S. Chand & Co, New Delhi (2014).
3. Murugesan, Allied Physics I & II, S. Chand & Co, New Delhi (2006).



### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of elasticity and its importance in beams	K1
CO2	Analyze the propagation of sound waves, and the production of ultrasonic waves and its applications	K2
CO3	Acquire the knowledge of heat radiation	K2
CO4	Understanding of Gravitation	K3& K4
CO5	Learn the basic ideas of electricity and its applications	K5& K6

K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create

### Mapping of COs with POs

PO \ CO	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	S
CO2	M	M	S	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: B.Sc. Physics				
Allied - II B.Sc Maths/ B.Sc Chemistry		Course Code: 21UPH2A02 - Mathematics 21UPH4A02 - Chemistry		Course Title : Allied Physics-II
Semester	Hours/Week	Total Hours	Credits	Total Marks
II / IV	5	75	4	100

### Course Objectives

1. To study vector atom model and to determine the method of critical potential.
2. To study the basics of nuclear physics
3. To impart a knowledge of solid state physics.
4. To provide an understanding of semiconductor and electronic devices.
5. To impart a knowledge of Laser.

#### **UNIT – I: Atomic Physics**

The vector atom model – Spatial quantization – Spinning of an electron –Quantum numbers associated with the vector atom model – Coupling schemes –LS and jj coupling – The Pauli's exclusion principle – Stern and Gerlach experiment.

#### **UNIT – II: Nuclear Physics**

Binding energy – Nuclear fission and nuclear fusion – Nuclear models – Liquid drop model – semi empirical mass formula – Merits and demerits – Shell model – Evidences for shell model – Nuclear radiation detectors – Ionization chamber – G.M counter.

#### **UNIT – III: Solid State Physics**

Bonding in crystals – Ionic bond – Covalent bond – Metallic bond – Molecular bond – Hydrogen bond – Their properties – Simple crystal structures – Simple cube – Body centered cube – Face centered cube – Co-ordination number – Atomic radius – Packing factor.

#### **UNIT – IV: Semiconductor Physics**

Theory of energy bands in crystals – Distinction between conductors, insulators and semiconductors – Intrinsic and extrinsic semiconductors – Zener diode characteristics – Break down voltage – Zener diode as voltage regulator.



Basic Logic Gates – OR, AND, NOT, NAND, NOR, XOR gates – NAND & NOR as universal building block – De Morgan's theorem and its verification – Laws of Boolean algebra – simplification of Boolean expressions.

### UNIT – V: Laser

Basic concepts of stimulated emission – Spontaneous emission and induced emission – population inversion and Meta stable state – Helium laser – Ruby laser – Semiconductor laser – application of laser – Uses of laser.

### BOOKS FOR STUDY:

1. R. Murugesan, Allied Physics I & II, S. Chand & Co, New Delhi (2006).  
[Unit covered: 1 and 2: Pages:182 - 197, 198 - 226]
2. R. Murugesan , Modern Physics, S. Chand & Co, New Delhi (2016).  
[Unit covered: 3and 4:Pages: 563 - 588,741 - 781, 860 - 872]
3. G.Senthilkumar , Engineering Physics -1,VRB Publishers Pvt.Ltd (2009).  
[Unit covered: 5: Pages: 63 - 88]

### BOOKS FOR REFERENCE:

1. N. Subramaniam, Brijlal and M.N. Avadhanulu, A text book of Optics, S. Chand & Co, New Delhi (2012).

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge of vector atom model and to determine the method of critical potential	K1 & K2
CO2	Learn the basics of nucleus, radiation detectors and chambers	K2 & K3
CO3	Acquire the knowledge of solid state physics	K3 & K4
CO4	Understanding of semiconductor and electronic devices	K5
CO5	Learn the knowledge of Laser	K6

K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create

**Mapping of COs with POs**

<b>PO</b> <b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	S	S	S
<b>CO2</b>	S	M	S	S	S
<b>CO3</b>	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S

S – Strong

M – Medium

L – Low



Program: B.Sc. Physics				
Allied Practical - I <b>B.Sc Maths/ B.Sc Chemistry</b>		<b>Course Code:</b> 21UPHA2P01 – Mathematics 21UPHA4P01 - Chemistry		<b>Course Title :</b> Allied Physics Practical -I
<b>Semester</b> I & II / III & IV	<b>Hours/Week</b> 3	<b>Total Hours</b> 45	<b>Credits</b> 2	<b>Total Marks</b> 100

### Course Objectives

1. To expose the technique of handling simple measuring instruments and also measure certain optical, mechanical and thermal properties of matter.
2. To construct and verify various basic electronic circuits.

### **LIST OF EXPERIMENTS**

1. Young's Modulus – Non uniform bending – Scale and Telescope.
2. Young's Modulus – uniform bending – Scale and Telescope.
3. Rigidity Modulus – Torsion pendulum.
4. Rigidity Modulus. – Static Torsion.
5. Surface tension and interfacial surface tension – drop weight method.
6. Sonometer – frequency of fork.
7. Sonometer – A.C frequency.
6. Specific heat capacity of liquid – method of mixtures – half time radiation correction.
7. Lee's disc – coefficient of thermal conductivity of a bad conductor.
8. Potentiometer – calibration of Low range Voltmeter.
9. Potentiometer – Internal resistance of coil.
10. Air Wedge – thickness of wire.
11. Newton's rings – radius of curvature.
12. Spectrometer – Solid Prism.
13. Spectrometer – Grating – Wavelength of spectral lines.
14. LED – Characteristics.





15. Zener diode – characteristics.
16. Demorgan's Theorem.
17. Low range power pack – using two diodes.
18. Basic Logic gates (AND, OR & NOT).
19. Field along the axis of a coil - Deflection Magnetometer – Determination of  $B_H$ .
20. Voltage regulated power supply using Zener diode.

### BOOKS FOR STUDY AND REFERENCE:

1. S. Balasubramanian, R. Ranganathan, M.N. Srinivasan, A Text book of Physics Practical, 2<sup>nd</sup> Revised Edition, S. Chand & Sons (2017).
2. C. C. Ouseph, U.J. Rao, V. Vijayendiran, Practical Physics, 1<sup>st</sup> Edition, Viswanathan.S Printers and Publishers Private Ltd. (2015).
3. C. L Arora, Practical Physics, S. Chand & Co (2010).

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Perform experiments on material to identify the strength the given objects	K1 & K2
CO2	Deal with liquids based on their Surface tension	K2
CO3	Learn the relation between frequency, length and tension of a stretched string under vibration	K2 & K4
CO4	Analyse the input and output characteristics of various electronic devices	K5 & K6
CO5	Examine the performance of logic gates using IC's and discrete components and to measure the output	K5 & K6

**K1– Remember, K2– Understand, K3– Apply, K4 –Analyze, K5– Evaluate, K6 –Create**

**Mapping of COs with POs**

<b>PO</b> <b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	M	S	S
<b>CO2</b>	M	M	S	S	S
<b>CO3</b>	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S

S – Strong

M – Medium

L – Low