

**ALLIED PHYSICS FOR
CHEMISTRY AND MATHS**



THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)

ELAMBALUR, PERAMBALUR – 621 220

PG & RESEARCH DEPARTMENT OF PHYSICS



VISION

To blossom as an institution of excellence, enabling, empowering and enlightening the youth and shaping them as fully developed human beings with the capacity to unfold their full mental potentiality resulting in the attainment of the wisdom to live constructively and meaningfully.

MISSION

- To provide congenial and stress- free environment and opportunities for the enhancement of knowledge and acquisition skills through the best exposure and training possible.
- To offer multifaceted and need-based academic programmes and to promote extension activities.
- To adopt technology-enabled new methods, approaches and techniques so that the teaching-learning process becomes learner-centred and learner-friendly.
- To maximize the participation of all the stakeholders in the development of the institution and the region.
- To sensitize the youth towards inclusive growth for socio-economic change, sustainable development, gender equality, eco-friendliness, etc.
- To enable the youth to experience the effects of globalization and facilitate them to grow as responsible citizens and leaders.
- To inspire them, through value-based education, to embrace the entire humanity while firmly rooted in the Indian ethos.
- To provide regular placement training and placement opportunities.
- To kindle the spirit of creativity and enhance research activities and enable them to attain international standards.

PROGRAMME OUTCOMES

Upon completion of the programme, the Undergraduate will be able to

1. Gain advanced knowledge resulting in entrepreneurship; innovation and newer opportunities for being employable in public and private sectors, research and development organizations.
2. Apply enhanced new techniques and adopt new technologies needed in the respective disciplines.
3. Appreciate the diversity of behavior in professional practice and act in accordance with the core values of chosen profession.
4. Demonstrate the knowledge, values and skills to be critical consumer of research practice and possess investigative skills to evaluate the practice.
5. Engage in lifelong learning process, have the ability to communicate the findings of Languages / Commerce / Management studies / Social Work / Computing Sciences / Physical Sciences / Biological Sciences / Life Sciences with the current knowledge.

PROGRAMME SPECIFIC OUTCOMES

1. Conceptual Knowledge and Awareness on the impact of Physics.
2. Observational acquired experimental skills measuring and computational techniques.
3. Problem analyzing and solving skill; understanding and logical thinking, reasoning and troubleshooting.
4. Acquire analytical and logical skill for higher education
5. Research orientated internship and employability enhancement.

ALLIED PHYSICS – I

PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS

Course: I

Semester: I

Course Code: 20UPH1AC1

Maximum Marks : 100

Hours / Week: 3

Internal Marks : 25

Credit: 3

External Marks : 75

Course Outcomes:

After successfully completing this course the student will be able to carry out the

- The principles of stress and strain set up in materials and to determine the various coefficients of elasticity.
- Flow of liquids due to viscous forces and the laws governing them as well as experimental ways of their determination.
- Transmission of heat due to process of conduction, convection and radiation and various laws involved in heat transformation.
- Various thermodynamic laws and the concept of entropy.
- The phenomenon like interference and diffraction, optical activity of liquids and its uses.

UNIT I: Properties of Matter

Young's modulus – Rigidity modulus – Bulk modulus – Poisson's ratio (definition alone) – Bending of beams – Expression for bending moment – determination of young's modulus – uniform and non-uniform bending. Expression for Couple per unit twist – work done in twisting a wire – Torsional oscillations of a body– Rigidity modulus of a wire and M.I. of a disc by torsion pendulum.

UNIT II: Viscosity

Viscosity – Viscous force – Co-efficient of viscosity – units and dimensions – Poiseuille's formula for co-efficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities - Bernoulli's theorem – Statement and proof – Venturimeter – Pitot tube.

UNIT III: Conduction, Convection and Radiation

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – Specific heat capacity of a liquid by cooling – thermal conduction –coefficient of thermal conductivity by Lee's disc method – Stefan's law of radiation. (No derivations).

UNIT IV: Thermodynamics

Zeroth and I Law of thermodynamics – II law of thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas – change in entropy when ice is converted into steam.

UNIT V: Optics

Interference – conditions for interference maxima and minima – Air wedge – thickness of a thin wire – Newton's rings – determination of wavelength using Newton's rings. Diffraction – Difference between diffraction and interference – Theory of transmission grating – normal incidence – optical activity – Biot's laws – Specific rotatory power – determination of specific rotatory power using Laurent's half shade polarimeter.

Text Books:

1. Properties of matter – Brijlal and Subramanyam – Eurasia Publishing co., New Delhi, III Edition 1983
2. Element of properties of matter – D.S.Mathur – S.Chand& Company Ltd, New Delhi, 10th Edition 1976
3. Heat and Thermodynamics–Brijlal&Subramanyam, S.Chand& Co, 16th Edition 2005
4. Heat and Thermodynamics – D.S. Mathur, SultanChand& Sons, 5th Edition 2014.
5. Optics and Spectroscopy –R.Murugesan, S.Chand and co., New Delhi, 6th Edition 2008.
6. A text book of Optics – Subramanyam and Brijlal, S. Chand and co.. New Delhi, 22nd Edition 2004.
7. Optics – Sathyaprakash, RatanPrakashanMandhir, New Delhi, VIIth Edition 1990.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20UPH1AC1	PROPERTIES OF MATTER,					3	3			
Course Outcomes	Programme Outcomes					Programme Specific Outcomes					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓			✓	✓	✓		✓	✓	✓	
CO2	✓	✓		✓	✓	✓		✓	✓		
CO3	✓			✓	✓	✓		✓	✓	✓	
CO4	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO5	✓		✓	✓	✓	✓		✓	✓	✓	
Number of Matches(✓) =38, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

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ALLIED PHYSICS PRACTICAL

Allied Course: II (Practical)
Course Code: 20UPH2AP1
Hours / Week: 3
Credit: 3

Semester: II
Maximum Marks : 100
Internal Marks : 40
External Marks : 60

Course Outcomes:

After successfully completing this course the student will be able to carry out the

- Know the constitution of matter, the microscopic and macroscopic properties they possess.
- Understand viscous properties of liquids.
- Find the current and voltage sensitivities of a spot galvanometer and calibrate a high range voltmeter.
- Know the wavelengths of light ray components semiconductors.
- Study the logic gates and verify their truth tables.

(Any twelve)

1. Non-Uniform Bending – Pin and Microscope method.
2. Sonometer – Verification of laws of transverse vibrations.
3. Specific heat capacity of a liquid – Newton’s law of cooling method.
4. Thermal conductivity of a bad conductor – Lee’s disc method.
5. Meter Bridge – Specific resistance of a material of a coil.
6. Newton’s Rings – Determination of Radius of Curvature(R).
7. Spectrometer – Refractive Index (μ) of solid prism.
8. Spectrometer - Determination of wavelength using Grating.
9. Characteristics of Junction Diode.
10. Characteristics of Zener Diode.
11. Co-efficient of Viscosity a liquid- Poiseuille’s method.
12. Surface Tension and Interfacial Tension of a liquid - Drop Weight method.
13. Construction of Full Wave Rectifier.
14. Study of Logic Gates - discrete components.
15. Potentiometer measurement of current.
16. Potentiometer measurement of resistance.
17. Surface tension- capillary rise method.
18. Figure of Merit-B.G.

References

1. Srinivasan M.N., Balasubramanian S. &Renganathan R., A Text book of Practical Physics, Sulthan Chand & Sons, New Delhi, 2000.

2. Somasundram S., Practical Physics, Apsara Publications, Tiruchirappalli, 2012.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20UPH2AP1	ALLIED PHYSICS – II					3	3			
Course Outcomes (Cos)	Programme Outcomes					Programme Specific Outcomes					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO4	✓	✓		✓	✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of Matches(✓) =47 , Relationship: Very High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

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ALLIED PHYSICS – II

ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS

Allied Course: II

Course Code: 20UPH2AC2

Hours / Week: 3

Credit: 2

Semester: II

Maximum Marks : 100

Internal Marks : 25

External Marks : 75

Course Outcomes:

After successfully completing this course the student will be able to carry out the

- Amount of current that can pass through a conductor using ohms law and its applications,
- Effect of magnetic field due to current and concept of resonant frequency in tuning circuits,
- Atom models and how energy can be released in nuclear fission and fusion processes,
- Construction of a rectifier, amplifiers and oscillator,
- Basic digital electronics principles through logic gates and the laws governing them.

UNIT I: Current Electricity

Ohm's law – Law of resistance in series and parallel – Specific resistance – capacitors – capacitors in serial and parallel – Kirchoff's laws – Wheatstone's network – condition for balance Carey-Foster's bridge – measurement of resistance – measurement of specific resistance –determination of temperature coefficient of resistance – Potentiometer – calibration of Voltmeter.

UNIT II: Electromagnetism

Electromagnetic Induction – Faraday's laws – Lenz law – Self Inductance – Mutual Inductance – Coefficient of Coupling A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit – impedance – resonant frequency – sharpness of resonance.

UNIT III: Atomic and Nuclear Physics

Bohr's atom model – radius energy – Atomic excitation – Ionization potential – Frank and Hertz Method – Nucleus – Nuclear properties – Mass defect – Binding energy. Radio isotopes – Uses of radio isotopes – Nuclear fusion and Nuclear fission – X-rays – Production – properties –Derivation of Bragg's law – uses in industrial and medical fields.

UNIT IV: Analog Electronics

Semiconductor – PN junction diode – Bridge rectifier – Zener diode – Regulated power supply.

Transistor – Working of a transistor – CE Configuration – current gain relationship between α and β – Transistor Characteristics – CE Configuration only – CE amplifier – feedback – Hartley oscillator – Colpitt's oscillator.

UNIT V: Digital Electronics

Number system – Decimal – Binary – Octal and Hexadecimal system – Double Dabble method – Binary addition, subtraction and multiplication – conversion of one number system to another number system. Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws and theorems of Boolean's algebra – De Morgan's theorems.

Books for Study and Reference:

1. Electricity and Magnetism – R. Murugesan, S. chand& co, 2001.
2. Modern Physics – R. Murugesan, S. chand& co, 1998.
3. Basic Electronics – B.L. Theraja, S. chand& co, 2003.

Relationship Matrix for course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	20UPH2AC2	ALLIED PHYSICS – III					3	2			
Course Outcomes (Cos)	Programme Outcomes					Programme Specific Outcomes					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO2	✓	✓	✓		✓	✓	✓	✓		✓	
CO3	✓		✓	✓	✓	✓		✓	✓		
CO4	✓	✓		✓		✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of Matches(✓) =43 , Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

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