K.M.G. COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)

Approved by the Government of Tamil Nadu
Permanently Affiliated to Thiruvalluvar University, Vellore.
Recognized under Section 2(f) and 12(B) of the UGC Act 1956
Accredited by NAAC (2nd Cycle) with (CGPA of 3.24/4) 'A' Grade

DEPARTMENT OF PHYSICS

ELECTIVE - PHYSICS

SYLLABUS FOR III SEMESTER

(CHOICE BASED CREDIT SYSTEM)

Under

LEARNING OUTCOMES-BASED CURRICULUM

FRAMEWORK (LOCF)

(Effective for the Batch of Students Admitted from 2024-2025)

COURSE DESCRIPTORS

Title of the Course	**ALLIED PHYSICS – I**	**Hours/Week**	03
Course Code	AUEPH33	**Credits**	03
Category	ELECTIVE COURSE - III	**Year & Semester**	II & III
Prerequisites	Higher secondary Physics	**Regulation**	2024

Objectives of the course:

- To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**WAVES, OSCILLATIONS AND ULTRASONICS**: Definition of simple harmonic motion (SHM) – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonic's: medical field – ultrasonography-NDT	CO1	K1 K2 K3
UNIT-II	**PROPERTIES OF MATTER**: Elasticity: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – determination of rigidity modulus by torsional pendulum Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method, Surface tension: definition– drop weight method – surface tension and interfacial surface tension	CO2	K1 K2 K3
UNIT-III	HEAT AND THERMODYNAMICS: Joule-Kelvin effect – Joule Thomson porous plug experiment – theory – temperature of inversion –Linde's process of liquefaction of air– liquid Oxygen for medical purpose– importance of cry coolers– entropy – change of entropy in reversible and irreversible process	CO3	K1 K2 K3

UNIT-IV	ELECTRICITY AND MAGNETISM: potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage.	CO4	K1 K2 K3
UNIT-V	DIGITAL ELECTRONICS AND DIGITAL INDIA: Semiconductor: Pure, N and P type semiconductor, PN junction diodes, Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification .	CO5	K1 K2 K3

Recommended Text Books

1. R.Murugesan (2001), Allied Physics ,S. Chand and Co, NewDelhi.

2. Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi

3.Brijlal and N.Subramaniam (1994), Properties of Matter, S.Chand and Co., New Delhi.

4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand and Co., New Delhi.

5. R.Murugesan (2005), Optics and Spectroscopy, S.Chand and Co, New Delhi.

6. A.Subramaniyam, Applied Electronics 2nd Edn., National Publishing Co., Chennai.

Reference Books

1.Resnick Halliday and Walker(2018).Fundamentals of Physics(11the Edition),John Willey and Sons, Asia Pvt.Ltd., Singapore.

2. V.R.Khanna and R.S.Bedi (1998), Text book of Sound1st Edn. Kedharnaath Publish and Co, Meerut.

3. N.S.Khare and S.S.Srivastava (1983), Electricity and Magnetism10thEdn.,AtmaRam and Sons, New Delhi.

4. D.R.Khanna and H.R. Gulati(1979). Optics,S. Chand and Co.Ltd., New Delhi.

5. V.K.Metha(2004).Principlesofelectronics6thEdn. S.Chandandcompany

6. V. Vijayendran, Introduction to Integrated Electronics, Viswanathan Printers & Publisher Pvt. Ltd.

Web Resources

1.https://youtu.be/M_5KYncYNyc

2. https://youtu.be/ljJLJgIvaHY

3. https://youtu.be/7mGqd9HQ_AU

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Demonstrate mathematically types of motion and extend their knowledge in the study of various dynamic motions.	K1,K2,K3
CO2	Explain about materials and their behaviors and apply it to various situations in laboratory and real life.	K1,K2,K3
CO3	Comprehend basic concept of thermodynamics, concept of entropy and associated theorems in the back ground of growth of this technology.	K1,K2,K3
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field.	K1,K2,K3
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and in tend their ideas to universal building blocks .	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	1	3	1	1	1	-	-	1	3	2	1
CO2	3	2	1	3	1	1	1	-	-	1	3	2	1
CO3	3	2	1	3	1	1	1	-	-	1	3	2	1
CO4	3	3	1	3	1	1	1	-	-	1	3	2	1
CO5	3	2	1	3	1	1	1	-	-	1	3	2	1

COURSE DESCRIPTORS

Title of the Course	**PHYSICS PRACTICALS**	**Hours/Week**	02
Course Code	AUEPPH43	**Credits**	01
Category	ELECTIVE COURSE -II	**Year & Semester**	II & IV
Prerequisites	Higher secondary Physics	**Regulation**	2024

Objectives of the course:

- Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyze.
- Able to do error analysis and correlate results.

UNITS	Contents	COs	Cognitive Levels
	1.Young's modulus by non-uniform bending using pin and microscope 2.Rigidity modulus by torsional oscillations without mass 3.Surface tension and interfacial Surface tension–drop weight method 4.Comparison of viscosities of two liquids–burette method 5.Verification of laws of transverse vibrations using sonometer 6.Calibrationof low range voltmeter using potentiometer 7. Determination of thermo emf using potentiometer. 8.Wavelength of mercury lines using spectrometer and grating 9.Refractive index of material of the lens by minimum deviation 10.Characterisation of Zener diode 11. Construction of AND,OR,NOT gates using diodes and transistor 12. NAND & NOR gates as a universal building block.	CO1 CO2 CO3 CO4 CO5	K1,K2, K3,K4, K5

Recommended Text Books

1. R.Murugesan (2001), Allied Physics ,S. Chand and Co, NewDelhi.
2. Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi
3.Brijlal and N.Subramaniam (1994), Properties of Matter, S.Chand and Co., New Delhi.
4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand and Co.,New Delhi.
5. R.Murugesan (2005), Optics and Spectroscopy, S.Chand and Co, New Delhi.
6. A.Subramaniyam, Applied Electronics 2nd Edn., National Publishing Co., Chennai.
7. B.L Theraja, Applied Electronics S.Chand and Co, 2003.

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Determine the material of the beam by young modulus method	K1,K2,K3
CO2	Find the rigidity modulus using torsional pendulum without mass.	K1,K2,K3
CO3	Verify the frequency of a.c (steel wire) using sonometer.	K1,K2,K3
CO4	Calculate internal resistance of a cell using potentiometer.	K1,K2,K3
CO5	Verify the truth table and Boolean algebra using logic gates.	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	1	3	-	-	-	-	-	1	3	2	1
CO2	3	2	1	3	-	-	-	-	-	2	3	2	1
CO3	3	2	1	3	-	-	-	-	-	1	3	2	2
CO4	3	3	1	3	-	-	-	-	-	1	3	2	1
CO5	3	2	1	3	-	-	-	-	-	1	3	2	2

COURSEDESCRIPTORS

Title of the Course	PHYSICS–II	Hours/Week	02
Course Code	AUEPH53	Credits	02
Category	ELECTIVE COURSE-II	Year& Semester	II & IV
Prerequisites	Higher secondary Physics	Regulation	2024

Objectives of the course:

- To understand the basic concepts of optics, modern Physics, Concepts of relativity and quantum physics, semiconductor physics and electronics.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**OPTICS:** Definition of **i**nterference–air wedge–determination of diameter of at hinwire by air wedge–diffraction–diffraction of Lights sound–normal incidence – experimental determination of Wavelength using diffraction grating (no theory)–polarization–polarization by double refraction – Brewster's law.	CO1	K1 K2 K3
UNIT-II	**ATOMICPHYSICS:** Mass number–atomic number–nucleons–vector atom model–various quantum numbers–Pauli's exclusion principle–electronic configuration– periodic classification of elements–photoelectric effect–Einstein's photoelectric equation–applications of photoelectric effect: solar cells, LED, photodiode.	CO2	K1 K2 K3
UNIT-III	**NUCLEAR PHYSICS:** Magic numbers–shell model – nuclear energy –mass defect – binding energy – radio activity–uses–half life–mean life-radio isotopes and uses–controlled and uncontrolled chain reaction–nuclear fission–energy release dinfission–critical size – atom bomb–nuclear fusion–thermonuclear reactions–differences between fission and fusion.	CO3	K1 K2
UNIT-IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES:** frame of reference – postulates of Special theory of relativity–Galilean transformation equations–Lorentz trans formation equations–derivation–length contraction–Time dilation –twin paradox–mass-energy equivalence.	CO4	K1 K2 K3 K4
UNIT-V	**SEMICONDUCTOR PHYSICS:** p-n junction diode Forward and reverse biasing–characteristic of diode–zener diode–Characteristic of zener diode–voltage regulator–full wave bridge rectifier–construction and working–advantages(no mathematical treatment)–USB cell phone charger–introduction to e-vehicles and EV charging stations.	CO5	K1 K2 K3

Recommended Text Books

1. R. Murugesan (2001), Allied Physics, S.Chandand Co, New Delhi.
2. Brijlaland N. Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi
3. Brijlaland N. Subramaniam (1994), Properties of Matter, S. Chand and Co., New Delhi.
4. J. B. Rajam and C.L. Arora (1976). Heat and Thermodynamics (8th edition), S.Chandand Co., New Delhi.
5. R. Murugesan (2005), Optics and Spectroscopy, S. Chand and Co, New Delhi.
6. A. Subramaniyam, Applied Electronics 2nd Edn., National Publishing Co., Chennai.

Reference Books

1. Resnick Halliday and Walker(2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. D.R. Khannaand H.R.Gulati (1979). Optics, S.Chandand Co.Ltd., New Delhi.
3. A. Beiser (1997), Concepts of Modern Physics, Tata McGrawHill Publication, New Delhi.
4. Thomas L.Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, New Delhi.
5. V.K. Metha (2004), Principles of electronics, 6th Edn., S. Chandand Company, New Delhi.

Web Resources

1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=emb_logo
2. https://www.youtube.com/watch?v=JrRrp5F-Qu4
3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/
4. https://www.atoptics.co.uk/atoptics/blsky.htm-
5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Explain the concepts of interference diffraction using principles of super position of waves	K1,K2,K3
CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts.	K1,K2,K3
CO3	Understand the importance of nuclear energy, safety measure scarried and get our Govt. agencies like DAE guiding the country in the nuclear field.	K1,K2
CO4	Describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation	K1,K2, K3, K4
CO5	Summarize the working of semiconductor devices like junction diode, Zenerdiode, transistors and practical devices we daily use like USB chargers and EV charging stations.	K1,K2,K3,

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	1	3	1	1	1	-	-	1	3	2	1
CO2	3	2	1	3	1	2	1	-	-	1	1	2	-
CO3	3	2	1	3	1	1	1	-	-	1	2	2	-
CO4	3	3	1	3	1	2	1	-	-	1	3	-	1
CO5	3	2	1	3	1	1	1	-	-	1	3	2	1