

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS101			Title	Batch:	2026 - 2029
				CC I: Properties of Matter and Sound	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	-		Credits:	4

Course Objective

To recognize the basic concepts of gravitation and to get exposure to the properties of liquids and solids

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge and understanding of properties of matter	K1/K2
CO2	Apply fundamental concepts on the applications of the elastic properties of solids	K3
CO3	Analyze the molecular theory of surface tension, viscosity and diffusion	K4
CO4	Evaluate the general terms in acoustics like intensity, loudness, reverberation etc, and study in detail about production, detection, properties and uses of ultrasonic waves	K5
CO5	Explore the impact of matter properties on actual concerns.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	L	-	M	-	H	-
CO2	M	H	M	L	H	L	M	-
CO3	L	M	H	M	L	M	-	L
CO4	-	L	M	H	M	L	-	M
CO5	-	M	H	H	M	M	-	H

H – High; M – Medium; L – Low

Properties of Matter and Sound

Units	Content	Hrs
Unit I	ELASTICITY: Hooke's law – stress-strain diagram – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)	12
Unit II	BENDING OF BEAMS: cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope	12
Unit III	FLUID DYNAMICS: Surface tension: definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature Viscosity:definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature	12
Unit IV	WAVES AND OSCILLATIONS: Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance. Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus	12
Unit V	ACOUSTICS OF BUILDINGS AND ULTRASONICS: Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. Ultrasonic waves: production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – <i>application of ultrasonic waves</i>	12
	Total Contact Hrs	60

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	D.S.Mathur	Elements of Properties of Matter	S.Chand & Co	2010
2	BrijLal & N. Subrahmanyam	Properties of Matter	S.Chand & Co	2003
3	D.R.Khanna & R.S.Bedi	Textbook of Sound	AtmaRam & sons	1969
4	BrijLal and N.Subrahmanyam	A Text Book of Sound	Vikas Publishing House	1995
5	R.Murugesan	Properties of Matter	S.Chand & Co	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	C.J. Smith	General Properties of Matter	Orient Longman Publishers	1960
2	H.R. Gulati,	Fundamental of General Properties of Matter	S Chand & Co	1977
3	A.P French	Vibration and Waves	MIT Introductory Physics, Arnold-Heinmann India	1973
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html https://www.youtube.com/watch?v=gT8Nth9NWPM https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s			

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPSF01			Title	Batch:	2026 – 2029
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	-	Foundation Course - Introductory Physics	Semester:	I
					Credits:	2

Course Objective

To help students get an overview of Physics before learning their core courses and serves as a bridge between the school curriculum and the degree programme.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Apply concept of vectors to understand concepts of Physics and solve problems	K1/K2
CO2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.	K3
CO3	Quantify energy in different process and relate momentum, velocity and energy	K4
CO4	Differentiate different types of motions they would encounter in various courses and understand their basis	K5
CO5	Relate various properties of matter with their behavior and connect them with different physical parameters involved.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	L	-	M	-	H	-
CO2	M	H	M	L	H	L	M	-
CO3	L	M	H	M	L	M	-	L
CO4	-	L	M	H	M	L	-	M
CO5	-	M	H	H	M	M	-	H

H – High; M – Medium; L – Low

Foundation Course - Introductory Physics

Units	Content	Hrs
Unit I	Vectors, scalars – examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions – standard physics constants	6
Unit II	Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces	6
Unit III	Different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples	6
Unit IV	Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations	6
Unit V	surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric	6
	Total Contact Hrs	30

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Mathur D.S.	Elements of Properties of Matter	S.Chand & Co	2010
2	Brijlal & Subramaniam.N	Properties of Matter	S.Chand & Co	2003

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	H.R. Gulati	Fundamental of General Properties of Matter	S.Chand & Co	1977
2	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html https://science.nasa.gov/ems/ https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/			

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Programme Code:	BSc	Programme Title:	Bachelor of Science	
Course Code:	26UPS202	Title	Batch:	2026 - 2029
		CC II: Thermal Physics	Semester:	II
Hrs/Week:	5		Credits:	5

Course Objective

- To understand of the fundamental laws and principles of thermodynamics and heat transfer

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge about the fundamental laws of thermodynamics and procure basic knowledge about real gas, specific heat and entropy	K1/K2
CO2	Apply the basic principles of heat transfer and theory of gases for various applications	K3
CO3	Categorize the various thermodynamic cycles used for energy productions	K4
CO4	Enumerate the theory behind low temperature physics and compare the working principles of various liquefaction process	K5
CO5	Design instruments to achieve low temperature environment for domestic applications and inculcate professional ethics to succeed even in diversified sectors	K6

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	-	L	-	-	H	H
CO2	H	H	-	M	L	-	H	H
CO3	H	H	-	H	L	-	H	H
CO4	H	M	-	H	L	-	H	H
CO5	H	H	-	H	H	H	H	H

Thermal Physics

Unit	Content	Hrs
I	KINETIC THEORY OF GASES Kinetic theory of gases – Concept of ideal or perfect gas – Kinetic model: Postulates of kinetic theory of gases – Expression for the pressure exerted by a gas- Estimation of rms speeds of molecules - Derivation of gas equation - Maxwell's law of distribution of velocities - Experimental verification - Degrees of freedom and Maxwell's law of equipartition of energy – Vander waal's equation of state - Critical constants-Quantum theory of specific heat : Specific heat of solids – Dulong and Petits law – Variation of specific heat of diatomic gases with temperature	15
II	TRANSMISSION AND RADIATION OF HEAT Conduction, convection and radiation – Coefficient of Thermal conductivity -Thermal diffusivity-Steady state- Lee's disc method of determining thermal conductivity of bad conductor-Searles method-Forbe's method - Radial and cylindrical flow of heat - Stefan's law and experimental verification - Determination of Stefan's constant - Blackbody - Properties of thermal radiation - Distribution of energy in the spectrum of a black body.	15
III	LOW TEMPERATURE PHYSICS Porous Plug experiment and theory - Liquefaction of Oxygen (Cascade process) - Liquefaction of Air (Linde's process) - Liquefaction of Hydrogen - Liquefaction of Helium (K.Onnes method) - Helium I and Helium II - Production of low temperature - Conversion of magnetic temperature to Kelvin temperature - Adiabatic demagnetization	15
IV	THERMODYNAMICS I Zeroth law of thermodynamics – Quasistatic process – Concept and comparison of heat and work - First law of thermodynamics - Isothermal and Adiabatic process -isochoric process- isobaric process - Work done during Isothermal and Adiabatic process - Reversible and Irreversible process - Second law of thermodynamics - Carnot's reversible engine - Carnot's theorem	15
V	THERMODYNAMICS II Entropy – Change in entropy during reversible and irreversible process - Third law of thermodynamics - Temperature-Entropy diagram- entropy of perfect gas and zero point energy – Maxwell's thermo-dynamical relations – Helmholtz function – Gibb's function – Enthalpy -T-ds equation	15
	Total contact hours	75

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Brijlal and Subrahmanyam	Thermodynamics and Statistical Mechanics	Sultan & Chand & Co Ltd, NewDelhi, (Units I –V).	2000

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kakani S.L.	Thermodynamics and Statistical Mechanics	Raj Publications, Jaipur.	2001
2	Singhal S.S.	Heat, Thermodynamics & Statistical Physics.	Pragathi Pragason, Meerut, 1 st edition.	2003
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc]			

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS203			Title	Batch:	2026-2029
Practical Hrs./Week	3	Tutorial Hrs./Sem.	-	CC Lab I: Physics Lab I	Semester:	I & II
					Credits:	3

Course Objective

To develop the skill to gain knowledge in Physics Lab

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles in executing the simple experiments	K2
CO2	Apply the knowledge of theory to experiments	K3
CO3	Analyze the experiment results with theory	K4
CO4	Evaluate different physical parameters with maximum accuracy	K5
CO5	Create various experimental techniques to find the Young's Modulus	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	M	L	H	L	H	M
CO2	M	H	M	L	H	M	M	M
CO3	L	M	H	H	M	M	L	H
CO4	-	L	M	H	M	M	L	H
CO5	-	-	M	M	M	H	-	H

H-High; M-Medium; L-Low

Physics Lab I

List of Experiments (Any fifteen):

1. Young's Modulus - Non uniform Bending - Pin and Microscope
2. Young's Modulus - Non uniform Bending - Koenig's method
3. Young's Modulus - Cantilever - Pin and Microscope
4. Young's Modulus - Uniform Bending - Scale and Telescope
5. Rigidity Modulus - Static Torsion
6. Rigidity Modulus and Moment of Inertia – Torsional Pendulum
7. Acceleration due to Gravity and Moment of Inertia - Compound pendulum
8. Surface Tension and Interfacial Tension - Drop weight method
9. Coefficient of Viscosity - Stoke's method
10. Coefficient of Viscosity - Searle's Viscometer
11. Verification of Laws of Transverse Vibrations and Frequency of a Fork – Sonometer
12. Viscosity of a Liquid - Capillary Flow - Variable Pressure head
13. Comparison of Viscosities of Liquids and Radii of Capillary tubes
14. Frequency of a Tuning Fork and Density of Solid and Liquid - Melde's String
15. Thermal Conductivity of a Bad Conductor - Lee's Disc
16. Specific Heat Capacity of a Liquid - Newton's Law of cooling
17. Specific Heat Capacity of a Liquid - Joule's Calorimeter
18. Refractive Index of a Prism - Spectrometer

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arora C.L	Practical Physics	S.Chand & Co, 19th Edition.	2007
2	Srinivasan M. L. Balasubramanian S. Ranganathan R.	A Text book of Practical Physics	Sultan Chand. New Delhi.	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Govindarajan S.R. Sundarajan S.	Practical Physics	Roc house & sons Pvt Ltd	1959
2	Dhanalakshmi A. Somasundaram S.	Practical Physics	Apsara Publishers	-
3	Gupta S.L. Kumar V.	Practical Physics	Pragati Prakashan, Meerut, 20th Edition	1999

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS304			Title	Batch:	2026 - 2029
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-	CC III: Mathematical Physics	Semester:	III
					Credits:	5

Course Objective

To apply the concepts of Mathematics in Physics and to acquire the basic knowledge about mathematical methods

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Gain knowledge on the mathematical concepts of Physics	K1
CO2	Relate mathematics and physics to understand nature	K2
CO3	Apply skills of mathematical modeling in applied fields	K3
CO4	Implement numerical methods in research fields	K4
CO5	Interpret mathematics to many problem in physics particularly in research Area.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H
CO2	M	H	H	H	M	M	H	H
CO3	H	M	M	H	M	M	H	H
CO4	M	M	M	M	H	H	H	H
CO5	M	H	H	H	M	M	H	H

H – High; M – Medium; L – Low

Mathematical Physics

Units	Content	Hrs
Unit I	VECTORS Gradient of a scalar field – Line, Surface and Volume integrals – Divergence of a vector function – Curl of a vector function and its physical significance – Important vector identities – Gauss divergence theorem – Stokes theorem – Curvilinear co-ordinates – Cylindrical co-ordinates (r, θ) - Spherical polar co-ordinates (r, θ, Φ) – Grad, Divergence and curl in terms of curvilinear, cylindrical and spherical polar co-ordinates	15
Unit II	MATRICES Matrix – Definition – Types of matrices – Rank of matrix – transpose matrix and its properties – Conjugate of a matrix and its properties – Conjugate transpose and its properties – Symmetric and Anti symmetric matrices – Hermitian and skew Hermitian – Characteristic equation of a matrix - Eigen values, Eigen vectors - Cayley Hamilton theorem – <i>Dirac matrices</i>	15
Unit III	LAPLACE TRANSFORM Laplace transform – Properties of Laplace transforms – Problems – Inverse Laplace transform : Properties of Inverse Laplace transform – Convolution theorem – Evaluation of Inverse Laplace transforms by convolution theorem - Problems	15
Unit IV	FOURIER SERIES Introduction to Fourier series - Dirichlet's theorem and Dirichlet's conditions - Fourier coefficients - even and odd functions - complex form of Fourier series - change of interval - Parseval's relations - application of Fourier series BETA AND GAMMA FUNCTIONS Symmetry property of beta function – Evaluation of beta function – Transformation of beta function - Evaluation of Gamma function - Transformation of Gamma function – Relation between beta and gamma function.	15
Unit V	NUMERICAL METHODS Solution of algebraic and transcendental equations: The Bisection method -The iterative method - Method of false position - Newton-Raphson method - Solution of ODE: Taylor's series method - Euler's method - Runge Kutta II order method – Trapezoidal Rule - Simple problems	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sathyaprakash	Mathematical Physics	Sultan Chand & Sons New Delhi	2005
2	Sastry S.S	Introductory Methods of Numerical Analysis	Prentice Hall Of India 3rd Edition	2003

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gupta B.D	Mathematical Physics.	Vikas Publication House, Noida\ 3rd Edition,	1989
2	Louis A.Pipes, Lawrence R.Harvill	Applied Mathematics For Engineers And Physicists	Mc Graw Hill Kogakusha Ltd, New Delhi	1970
3	Chattopadhyay P.K	Mathematical Physics	Wiley Eastern Limited, New Delhi	1990
4	Venkataram M.K.	Numerical Methods in Science and Engineering	The National Publishing Company, New Delhi	1999
5	Raman K.V.	Group Theory	Tata McGraw - Hill publishing company Ltd, New Delhi	1990

Related online contents [MOOC, SWAYAM, NPTEL, Websites etc]

<https://youtu.be/OeENE7c9OaA>

https://youtu.be/Ta_i89A-Nkk

<https://youtu.be/c9NibpoQjDk>

https://youtu.be/T7I_C_1L75I

https://youtube.com/playlist?list=PLbMVogVj5nJRhl_6TUGChpnt2Lg0AZvZu

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Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UPS3N1	Title	Batch:	2026-2029
		Non-Major Elective I: Physics of Home & Personal Gadgets	Semester:	III
Hrs/Week:	2		Credits:	2

Course Objective

- To create awareness and to develop basic skills about environment, energy resources and its application

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember basic knowledge on renewable energy sources	K1/K2
CO2	Apply the concepts of Physics to construct devices	K3
CO3	Analyze the environmental impacts using the core concepts of Physics	K4
CO4	Create energy devices based on the required applications	K5
CO5	Design, construct, evaluate and troubleshoot the appliances using the acquired knowledge	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	-	H	M	H	M	H
CO2	M	-	M	M	H	H	-	M
CO3	H	H	H	L	-	L	H	-
CO4	M	L	H	M	M	M	H	M
CO5	H	L	M	M	H	-	H	L

H – High; M – Medium; L – Low

Physics of Home & Personal Gadgets

Unit	Content	Hrs
I	Smartphone Secrets: Touchscreens, Lithium-ion batteries, and how sensors (like the one that rotates your screen) work.	3
II	The Modern Kitchen: Microwave ovens (molecular friction), Induction stoves (magnetic induction), and the Refrigerator (the cooling cycle).	3
III	Light & Sight: LED bulbs vs. Tubelights, how spectacles fix vision, and the physics behind a DSLR/Smartphone camera.	3
IV	Home Electricity: Understanding the "Unit" On The Meter, Safety Fuses (MCB), and How an Inverter works during a power cut.	3
V	Household Tools: The physics of a Vacuum cleaner (pressure), an Electric Iron (thermal resistance), and a Hairdryer.	3
Total contact hours		15

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	The Editor	The Hindu Speaks on Scientific Facts	Kasturi and Sons Ltd. Chennai	2006
2	Rai G. D	Non Conventional Sources of Energy	Khanna Publishers, NewDelhi	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Richard P. Feynman, Robert B. Leighton, Matthew Sands	The Feynman Lecture on Physics	Narosa Publishing House, New Delhi	2008
2	David Halliday, Robert Resnick, Jearl Walker	Fundamentals of Physics	John Wiley Publications. 6 th Edition	2000

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Programme Code:	BSc	Programme Title:	Bachelor of Science	
Course Code:	26UPS3N2	Title	Batch:	2026-2029
		Non-Major Elective II: Physics of Communication & Universe	Semester:	III
Hrs/Week:	2		Credits:	2

Course Objective

- To develop the basic skills about various objects that we use daily

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamental concept of various energy resources	K1/ K2
CO2	Apply the physical principles of conventional and non-conventional sources to study the device and make measurements.	K3
CO3	Analyze the harvested energy from various available sources and utilize it based on the requirements	K4
CO4	Create solar related devices and make measurements	K5
CO5	Design and construct energy related devices and apply based on the available needs	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	H	M	H	M	H
CO2	M	-	M	M	H	H	-	M
CO3	H	H	M	L	-	L	H	-
CO4	M	L	H	H	M	H	H	M
CO5	H	M	M	M	H	-	H	L

H- High; M- Medium; L- Low

Physics of Communication & Universe

Unit	Content	Hrs
I	Sound & Music: How speakers/headphones work, Noise Cancellation technology, and why musical instruments sound different	3
II	Global Connectivity: How your voice travels from India to Chicago via Undersea Fiber Optic cables and Satellites.	3
III	Medical Gadgets: A simple look at how a Thermometer, BP Monitor, and Pulse Oximeter (Physics in healthcare) work.	3
IV	Renewable Energy: Solar Panels For Homes, Windmills, And The Future Of Electric Vehicles (EVs).	3
V	Space & Beyond: What are Black Holes? How do GPS satellites tell us where we are? (Physics of the Stars).	3
Total contact hours		15

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1.	Rai G. D	Non Conventional Sources of Energy	Khanna Publishers, NewDelhi	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Rai G. D.	Solar Energy Utilization	Khanna Publishers NewDelhi	
2	Garg H.P. Prakash J	Solar Energy Fundamentals And Applications	Tata McGraw Hill Publications, New Delhi	

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS405			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	CC IV: Electricity & Magnetism	Semester:	IV
					Credits:	5

Course Objective

To familiarize the students with the fundamental concepts and laws in electricity & magnetism and establish a foundation in electromagnetism

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge on fundamental concepts of electric and magnetic fields, potentials and electromagnetic induction	K1 / K2
CO2	Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances	K3
CO3	Analyze the problems in electromagnetism that establishes the conceptual understanding	K4
CO4	Evaluate the basic and advanced problems in the field of static and dynamic fields	K5
CO5	Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	M	-	H	-
CO2	M	H	-	-	H	-	M	-
CO3	-	M	H	M	M	-	M	M
CO4	-	-	M	H	-	L	-	H
CO5	-	-	-	M	-	M	-	H

H – High; M – Medium; L – Low

Electricity & Magnetism

Units	Content	Hrs
Unit I	ELECTRIC FIELD AND POTENTIAL Concept of charge - Electric Field (E) - Electric potential and Potential difference (V) - Electric potential energy (U) - Relation between E and V - Equipotential surfaces - Poisson's and Laplace equations - Potential and field due to an electric dipole - Potential and field due to a quadruple - Potential and field due to uniformly charged disc - Potential due to two concentric spherical shells of charge - Potential energy due to charge distribution – dipole in an electric field	15
Unit II	CAPACITORS AND DIELECTRICS Capacitors - Parallel plate capacitor - Cylindrical capacitor - Spherical capacitor - Guard ring capacitor - Energy stored in a capacitor - Force of attraction between capacitor plates - Dielectric constant - Polar and nonpolar molecules - Polarization of dielectric - Capacity of a parallel plate capacitor partially and completely filled with dielectric - Electric polarization vector P - Electric displacement vector D - Relation between D, E and P - Dielectric susceptibility and permittivity - Physical meaning of polarization – Mechanism of polarization	15
Unit III	MAGNETOSTATICS Magnetic effect of current - Definition of magnetic field vector - Lorentz force - Force on a current carrying wire - Magnetic flux - Gauss law in magnetostatics - Torque on a current carrying coil in uniform magnetic field - Potential energy of a current loop - Ballistic galvanometer - Deadbeat condition - Comparison of emfs and capacitances – Biot-Savart's law - field due to steady current in a long straight wire - Interaction between two long parallel wire carrying currents - Magnetic field along the axis of a circular coil - Field along the axis of a solenoid - Magnetic dipole - Ampere's law - Applications of ampere's law: long wire – parallel conductors – solenoid - <i>toroid</i>	15
Unit IV	ELECTROMAGNETIC INDUCTION Faraday's laws of Electromagnetic induction - Deduction of Faraday's laws from Lorentz's force - Self-inductance - Calculation of self-inductance for a solenoid - Energy stored in magnetic field - Mutual inductance - Energy stored in two interacting circuits - DC circuits : Simple RL circuit - Growth and decay of current - RC circuit - Charging and discharging of a condenser - Ideal LC circuit - Series LCR circuit - <i>Discharge of a condenser through inductance and resistance</i>	15
Unit V	MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES Basic equations - Types of current - Vacuum displacement current - Maxwell's equations - Maxwell's equations in free space - Electromagnetic waves in free space - Electromagnetic waves in isotropic non - conducting media - Refractive index - Impedence of dielectric media - Energy density of electromagnetic wave - Poynting theorem - Energy per unit volume	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. K.K.Tewari	Electricity and Magnetism	S Chand and Co Ltd, New Delhi	2017 (Reprint)

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tayal T.C.	Electricity and Magnetism	Himalaya publication house, Mumbai	2001
2	Murugesan R	Electricity and Magnetism	S Chand and Co Ltd, New Delhi	2016 (Reprint)
3	David J Griffiths	Introduction to Electrodynamics	PHI Learning Pvt. Ltd., New Delhi	2009
4	A.S.Mahajan & A.A.Rangwala	Electricity and Magnetism	Tata McGraw Hill Publishing Company	2007 (Reprint)
5	Edward M. Purcell & David J. Morin	Electricity and Magnetism	Cambridge University Press	2016 (Reprint)
6	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/122/106/122106034/			

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. A.G.Kannan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UPS4N3	Title	Batch:	2026 - 2029
		Non-Major Elective II: Principles of Physics –II	Semester:	IV
Hrs/Week:	2		Credits:	2

Course Objective

To develop the scientific interests on the portable electronic devices for day to life

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic knowledge about portable devices	K1/K2
CO2	Apply the central concepts of electric and optical devices	K3
CO3	Analyze the basic physical phenomena on the operating features of scientific devices	K4
CO4	Evaluate the applications of the physical quantities	K5
CO5	Create equipment for measuring	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	M	M	H	H	H
CO2	M	H	M	M	M	H	-	M
CO3	H	H	-	H	L	L	H	-
CO4	H	L	H	H	M	H	M	M
CO5	H	M	-	M	H	M	H	M

H – High; M – Medium; L – Low

Principles of Physics –II

Unit	Content	Hrs
I	Battery –Types of Battery–Hot air balloons – Remote control in TV –Superconductor – <i>Nuclear reactors</i>	3
II	Photochromic glasses – Exhaust silencer – Optical fibers – Radar and Sonar – Fluorescent Lamps – Holograms – Touch screens	3
III	Earthquake measurement – Splitting of white light – GPS – Origin of Gravity – Use of Infrared spectroscopy – Static electricity – Three pin electric plugs – Electric line tester- Artificial teeth –Purity of Honey - Breath analyzers	3
IV	Introduction – Laser – Principle - Characteries – Elements of laser – Types of laser – Applications – Advantages – Disadvantages.	3
V	TFM on soap - Cell phones - Refrigerants and their use in refrigerators - Frost formation - Air Cooler & Conditioner - Black box in Planes - Speech synthesizers - Bullet proof glass - - Aeroplane not affected by lightning- Lie detector-Biological Weapon – Basics of computers- Super Computers - Computers Simulation- <i>Oil with Petrol for two wheelers</i>	3
	Total contact hours	15

- *Italic font denotes self study*

Additional activities

Seminar, Assignment, Experience discussion, PPT

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	The Editor	The Hindu Speaks on Scientific Facts	Kasturi and Sons Ltd. Chennai	2006

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Richard P. Feynman, Robert B. Leighton, Matthew Sands	The Feynman Lecture on Physics	Narosa Publishing House, New Delhi	2008
2	David Halliday, Robert Resnick, Jearl Walker	Fundamentals of Physics	John Wiley Publications. 6 th Edition	2000

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. K.Somasundaram Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UPS4N4	Title	Batch:	2026- 2029
		Non-Major Elective II : Renewable Energy Sources - II	Semester:	IV
Hrs/Week:	2		Credits:	2

Course Objective

To enrich the fundamental scientific skills in inexhaustible sources of energies

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember and understand various energy sources like wind energy, bio mass energy and hydrogen energy	K1/ K2
CO2	Apply the basic physical concepts to develop devices based on the conversion technologies	K3
CO3	Analyze the different forms of energy utilizing the basic concepts for various applications	K4
CO4	Design and develop the various energy related devices	K5
CO5	Evaluate and make measurements of the constructed devices	K6

Mapping

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	M	M	H	L	H	L	H	M
CO2	M	M	H	M	H	M	L	H
CO3	H	H	L	H	H	H	H	L
CO4	M	H	H	M	M	M	M	H
CO5	H	M	H	M	L	H	L	M

H- High; M- Medium; L- Low

Renewable Energy Sources - II

Unit	Content	Hrs
I	WIND ENERGY Introduction- Nature of the wind – The power in the wind- Basic components of wind energy conversion system- Classification of WEC systems- <i>Direct heat applications.</i>	3
II	ENERGY FROM BIOMASS Introduction- Biomass conversion technologies- Wet processes – Dry processes - Photosynthesis – Classification of biogas plants.	3
III	GEOTHERMAL ENERGY Introduction- Estimates of geothermal power – Geothermal sources – Hydrothermal resources – Applications of geothermal energy.	3
IV	ENERGY FROM OCEANS Introduction- Ocean thermal electric conversion by open and closed cycles- Energy from tides- Basic principle of tidal power- Advantages and limitations of small scale hydroelectric.	3
V	HYDROGEN ENERGY Introduction – Properties of hydrogen – Electrolysis or the electrolytic production of hydrogen – Hydrogen storage – <i>Utilization of hydrogen gas.</i>	3
Total contact hours		15

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Rai G. D	Non Conventional Sources of Energy	Khanna Publishers, NewDelhi	2002

26UPS4N4

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Rai G.D	Solar Energy Utilization	Solar Energy Utilization	2006
2	Sulchatme S.P	Principles of Thermal Collection and Storage	Tata McGraw Hill Publication, New Delhi.	2014

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Name: Dr. V.Saravanan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UPS406	Title	Batch:	2026-2029
		CC Lab II: Physics Lab II	Semester:	III & IV
Hrs/Week:	3		Credits:	3

Course objective

- To understand the theory with hands-on experience.

CO No.	Course Outcome Statement	PO Mapping
CO1	Explain the working of experimental setups, measurement procedures, sources of error, and the underlying theory of optical interference, material properties, electrical calibration, and magnetic characterization.	PO1
CO2	Perform experiments to determine refractive index of prism and liquid, wavelength, TCR, dispersive power of prism, Cauchy's constants, calibration of meters, and magnetic parameters using standard laboratory techniques.	PO1,PO3,PO4,PO14
CO3	Analyze the observed data, plot characteristic graphs, and interpret the results to verify theoretical concepts in optics, electricity, and magnetism.	PO3,PO5,PO6,PO8
CO4	Evaluate the accuracy and reliability of experimental results by comparing with standard values and assessing sources of error and limitations of the measuring instruments	PO3,PO6,PO8
CO5	Design instruments by using the principles behind every experiment and develop skills to work collectively	PO10,PO15

Correlation Level: 3 – High | 2 – Medium | 1 – Low

CO–PO Mapping Matrix (UGC – B.Sc. Programme Outcomes)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3														
CO2	3		2	2										2	
CO3			2		1	1		1							
CO4			2			1		1							
CO5										2					2

Physics Lab II

List of Experiments (Any fifteen):

1. Calibration of Voltmeter (Low & High Range) – Potentiometer
2. Calibration of Ammeter(High Range) and Reduction Factor of T.G – Potentiometer
3. Temperature Coefficient & Resistance of a coil of wire - Potentiometer
4. E.M.F of a Thermocouple - Potentiometer
5. Figure of merit - Current & Voltage Sensitivity – Ballistic Galvanometer
6. Comparison of Resistances - Specific Resistance - Ballistic Galvanometer
7. Absolute capacity of a Condenser - Ballistic Galvanometer
8. Mutual Inductance of a Coil & Comparison of Mutual Inductance – Ballistic Galvanometer
9. Determination of H - Circular Coil carrying current –Vibration Magnetometer
10. Determination of M - Field along the axis of a Circular coil carrying current
11. Thickness of a Wire - Air wedge
12. Radius of curvature and Refractive index of a lens - Newton's Rings
13. Refractive Index of a Liquid - Spectrometer - Hollow Prism
14. Refractive Index of a Prism - Spectrometer - i-d curve
15. Refractive Index of a Prism - Spectrometer - i-i' curve
16. Wavelength of different colours of Mercury spectrum and Dispersive power of a Grating – Normal Incidence-Spectrometer
17. Refractive Index - Spectrometer - Small Angle Prism
18. Cauchy's Constants and Dispersive Power of a Prism - Spectrometer

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Govindarajan S.R. Sundarajan S.	Practical Physics	Roc house & sons Pvt Ltd	1959

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dhanalakshmi A. Somasundaram S.	Practical Physics	Apsara Publishers, Book II.	

Designed by	Verified by HOD	Checked by CDC	Approved by COE
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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS507			Title	Batch:	2026 - 2029
				CC V: Mechanics	Semester:	V
Lecture Hrs./Week	5	Tutorial Hrs./Sem.			Credits:	5

Course Objective

To acquire a complete knowledge about mechanics and classical dynamics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the laws involved in Rigid body dynamics and classical mechanics	K1
CO2	Gain a deeper insight into the physical concepts and its application to various physical systems	K2
CO3	Apply these formalisms to obtain equations of motion for simple systems	K3
CO4	Analyze the problem and frame equations of motion	K4
CO5	Ability to Use the necessary skills and tools to write equations for real time problems	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	H	M	L	H	H
CO2	H	M	H	H	M	H	H	H
CO3	H	M	H	H	H	H	M	M
CO4	H	M	M	H	H	H	M	M
CO5	H	M	M	H	H	H	M	H

H – High; M – Medium; L – Low

Mechanics

Units	Content	Hrs
Unit I	NEWTON'S LAWS OF MOTION AND CONSERVATION LAWS Newton's Laws of motion - forces and equations of motion - motion of a particle in a uniform gravitational field - Newtonian law of universal gravitation - Conservation laws - conservation of energy - Work - kinetic and potential energy - Examples - Conservative Forces - Potential energy and conservation of energy in gravitational and electric field – Examples - Conservation of Linear and angular momentum: Internal forces and momentum conservation - center of mass – Examples.	15
Unit II	ELEMENTARY RIGID BODY DYNAMICS The equation of motion - angular momentum and kinetic energy - Moment of inertia - parallel axis theorem - Perpendicular axis theorem - examples - Rotation about fixed axis: time dependence of motion - Examples - Rolling without slipping - Torque about center of mass - Example - Rotation about fixed axes: Behavior of angular momentum vector.	15
Unit III	MECHANICS OF SYSTEM OF PARTICLES Conservation theorem for a system of particle: Conservation theorem for linear momentum, angular momentum and energy - Constrained motion - Types of constraints with examples - Forces of constraints - Degrees of freedom - Generalized coordinates - Generalized notation for Displacement, Velocity, Acceleration, Momentum, Force and Potential - Limitations of Newton's Law.	15
Unit IV	LAGRANGIAN FORMULATION Delta-Variation process - Hamilton's principle - Deduction of Lagrange's equations of motion from Hamilton's principle - Principle of virtual work - D'Alembert's principle - Deduction of Lagrange's equations by D'Alembert's principle for both conservative system and non-conservative system - Deduction of Hamilton's principle from D'Alembert's principle - Deduction of Newton's second law of motion from Hamilton's principle - Applications of Lagrange's equation: Linear harmonic oscillator, Simple pendulum, <i>Compound pendulum</i> .	15
Unit V	HAMILTONIAN FORMULATION OF MECHANICS View points of the new development - Phase space and the motion of systems - Hamiltonian - Hamilton's canonical equations of motion - Cyclic coordinates - Physical significance of H - Advantages of Hamiltonian approach - Deduction of canonical equations from variational principle - Applications of Hamilton's equations of motion; Simple Pendulum, Compound pendulum, Linear harmonic oscillator.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Murugeshan. R	Mechanics and Mathematical Methods	S.Chand & Co Ltd, New Delhi \ Reprint	2006
2	Mathur D.S	Mechanics	S. Chand & Co Ltd, New Delhi \ 2 nd Edition	2012
3	Narayanamurthi. M and Nagarathinam. M	Dynamics	National Publishing Company \ Revised Edition	1988
4	Gupta, Kumar & Sharma	Classical Mechanics	Pragati Prakashan \ 19 th edition	2010
5	Murugeshan. R	Modern Physics	S. Chand & Co Ltd \ Ninth revised edition	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bhargava& Sharma	A Text Book of Mechanics	Ratan Prakashan Mandir \ 7 th edition	1990
2	Arthur Beiser	Concepts of Modern Physics	TMH-\ 6 th edition	2003
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://www.youtube.com/watch?v=83QCm3LkuEg https://nptel.ac.in/courses/115105098 https://www.youtube.com/watch?v=ApUFtLCrU90			

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Name: Dr. V.Saravanan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS508			Title	Batch:	2026- 2029
				CC VI:	Semester:	V
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-	Optics & Spectroscopy	Credits:	5

Course Objective

To understand the mechanism of energy transfer and to impart knowledge in electromagnetic spectrum

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the characteristics of light and interaction of electromagnetic radiations with matter	K1
CO2	Apply the principle of molecular spectroscopy in identification of properties of materials and applications	K2
CO3	Categorize the spectra from vibrational and rotational motion of atoms or molecules	K3
CO4	Explain the theoretical models of spectroscopy that are suitable for each phenomena related to radiations	K4
CO5	Plan and design the instruments based on electromagnetic radiations by using the tools and methodologies of optics and spectroscopy	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	H	H
CO2	H	H	L	H	M	M	H	H
CO3	H	M	M	M	L	L	M	M
CO4	H	M	H	L	M	H	H	M
CO5	H	M	L	H	H	H	H	H

Optics & Spectroscopy

Units	Content	Hrs
Unit I	GEOMETRICAL OPTICS Fermat's Principle - Aberrations - Spherical aberrations in lens - coma - Astigmatism - chromatic aberration - dispersion by a prism - Cauchy's dispersion formula - dispersive power, achromatism in prism - deviation without dispersion - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances.	15
Unit II	INTERFERENCE & DIFFRACTION Theory of interference - Fresnel's biprism experiment - Determination of wavelength - Interference due to reflected light – Air wedge - Newton's rings - Determination of wavelength and refractive index of a liquid - Fresnel's explanation of rectilinear propagation of light - Fresnel's diffraction at a circular aperture - Fraunhofer diffraction at a single slit - Theory of the plane transmission grating - Determination of wavelength.	15
Unit III	POLARISATION Polarization of transverse waves - Plane of polarization - Brewster's law and Brewster's window - Polarization by refraction - Double refraction - Principal section and principal plane - Nicol prism - Nicol prism as an analyzer - Theory of circularly and elliptically polarized light - Optical activity - Fresnel's explanation of rotation - Specific rotation - <i>Laurent's half shade Polarimeter</i> .	15
Unit IV	MOLECULAR SPECTRA Rotation of molecules - Rotational spectra of rigid diatomic molecule - Techniques and Instrumentation of Microwave Spectroscopy - Energy of a Vibrating diatomic molecule - Simple harmonic oscillator - Techniques and Instrumentation of Infrared Spectroscopy - Applications of Microwave & Infrared Spectroscopy (Basic ideas) - Raman effect and characteristics - Experimental study - Quantum theory of Raman effect.	15
Unit V	LASER & FIBER OPTICS Laser characteristics - Einstein's coefficients - Population inversion - Pumping methods - Essential elements and Action of laser system - Ruby laser – He-Ne laser – <i>Applications: Holography and Lasers in medicine.</i> Construction and types of optical fiber - Critical angle - Acceptance angle, Acceptance cone and Numerical aperture - Propagation of light through optical fiber - Optical fiber configurations - Fiber optic communication system.	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

26UPS508**Text Books**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Subramanyam N. Brijlal	Waves and Oscillations	S.Chand & Co, New Delhi	
2	Subrahmanyam. N. Brijlal, Avathanulu M.N.	A Textbook of Optics	S.Chand and Co Ltd., New Delhi	2008
3	Colin N .Banwell, Elaine M. Mc Cash	Fundamentals of Molecular Spectroscopy	Tata McGraw-Hill, New Delhi	2004
4	Gupta S.L. Kumar V. Sharma R.C.	Elements of Spectroscopy	Pragati Prakashan, Meerut	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Halliday, Resnick	Physics Part I & II	Wiley Eastern Ltd, New Delhi	1994
2	Jenkins, White	Fundamentals of Optics	McGraw-Hill., New York	1981
3	Manas Chanda	Atomic Structure and Chemical Bond	Tata McGraw Hill, New Delhi	1982
4	Gurdeep Chatwal, Sham Anand	Spectroscopy	Himalaya Publishers, Mumbai	1987
5	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://www.youtube.com/watch?v=ML7HcZo6IaE https://nptel.ac.in/courses/115107095 https://nptel.ac.in/courses/104106122			

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Signature:	Signature:	Signature:	Signature:

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS509			Title	Batch:	2026 - 2029
				CC VII: Relativity & Quantum Mechanics	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-		Credits:	5

Course Objective

To develop the skill to gain knowledge in Relativity & Quantum Mechanics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts and consequences of special theory of relativity	K1/K2
CO2	Understand the limitations of classical mechanics and acquire the knowledge of Wave nature of matter	K3
CO3	Illustrate Heisenberg uncertainty principle and obtain the wave equation for time dependent and time independent systems	K4
CO4	Analyze the wave equation and use it to solve physical problems	K5
CO5	Establish Schrodinger equation for hydrogen atom and outline the significance of Quantum numbers	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	M	H	H	H	H	H	H	H

CO2	H	H	H	H	H	M	H	H
CO3	M	H	H	H	M	M	H	H
CO4	H	M	H	H	H	H	H	H
CO5	H	H	H	H	M	H	H	H

H – High; M – Medium; L – Low

Relativity & Quantum Mechanics

Units	Content	Hrs
Unit I	SPECIAL THEORY OF RELATIVITY Frame of reference: Galilean transformations and their limitations – Michelson Morley experiment - Einstein's postulates and Lorentz transformations – Length contraction - Time dilation - Simultaneity – Variation of Mass with velocity – Mass-energy equivalence with experimental evidence	16
Unit II	ORIGIN OF QUANTUM THEORY & WAVE PROPERTIES OF PARTICLES Inadequacy of Classical mechanics : Hydrogen atom & Bhor Model, Blackbody radiation, Photoelectric effect - Matter waves – Expression for de-Broglie wavelength – Phase velocity – Group velocity – Expression for group velocity – Experimental study of matter waves : G. P. Thomson's experiment	14
Unit III	UNCERTAINTY PRINCIPLE & SCHRÖDINGER'S EQUATION Heisenberg's Uncertainty principle and its illustrations: Gamma ray microscope & Diffraction of a beam of electrons by a slit – Time dependent and Time independent forms of Schrodinger equation – Statistical interpretation of wave function	15
Unit IV	OPERATOR FORMALISMM OF QUANTUM MECHANICS Postulates of Quantum Mechanics – Operator for momentum – Kinetic Energy – Total Energy - Orbital Angular Momentum – Hermitian Operator & its properties	15
Unit V	EIGEN VALUE PROBLEMS Infinite square well potential – <i>Square well in three dimensions</i> - Potential Step - The barrier Penetration problem - Linear Harmonic oscillator (Qualitative Study only)	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS509**Text Book**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arthur Beiser	Concepts of Modern Physics	Tata McGraw Hill 7 th Edition	2017
2	R.Murugesan, Kiruthiga Sivaprasath	Modern Physics	S. Chand	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David J. Griffiths, Darrel F Schroeter	Introduction to Quantum Mechanics	Cambridge University Press	2018
2	Kamal Singh, S.P. Singh	Elements of Quantum Mechanics	S.Chand	2008
3	G.Aruldas	Quantum Mechanics	PHI Learning Private Limited	2009
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/115101107 https://archive.nptel.ac.in/courses/115/101/115101011/			

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Name: Dr. M. Karthika Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS5E1			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	DSE I : Basic Electronics & Circuit System	Semester:	V
					Credits:	5

Course Objective

To provide fundamental skill to analyze electronic circuit systems and introduce basic semiconductor devices, their characteristics, operations and applications

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts of electronic circuits with semiconductor devices	K1 / K2
CO2	Apply the knowledge of circuits to investigate PN junctions in semiconductor devices under various conditions	K3
CO3	Demonstrate familiarity with basic electronic components and use them to design simple electronic circuits	K4
CO4	Recognize a variety of exciting high-tech products and systems enabled by electronics	K5
CO5	Design, develop and simulate the new electronic circuits for applications in various fields	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	M	-	H	-

CO2	M	H	-	-	H	-	M	M
CO3	L	M	H	M	M	L	M	H
CO4	-	L	M	H	L	M	-	H
CO5	-	-	-	M	-	M	-	H

H – High; M – Medium; L – Low

Basic Electronics & Circuit System

Units	Content	Hrs
Unit I	DC CIRCUITS AND ALTERNATING CURRENTS DC Circuits: Current, Voltage, Resistance, Ohm's Law, Joule's Law, Resistors and Batteries - Series and Parallel Circuits - Networks - Kirchoff Rules - Thevenin's Theorem - Norton's Theorem - Maximum power transfer theorem – Proportional Voltage and Current formula – D'arsonval meter as Ammeter, Voltmeter, Ohmmeter (Basic ideas) - Alternating currents: Frequency, Amplitude and Phase - RMS value and Power Factor - Capacitance and Inductance - <i>Transformer</i>	15
Unit II	SEMICONDUCTOR DEVICES AND CIRCUITS Semiconductor and Energy bands - Doped Semiconductor - PN Junction diode and Zener diode - Characteristics - Half wave, Full wave and Bridge rectifiers – Capacitance filter-Two pin regulated power supply - Voltage doublers - Clippers and Clampers - Transistor and its action - Common base and Common emitter Configurations - Relations between α and β - Load line and Operating point - Stability - Voltage divider Self bias - JFET and its characteristics	15
Unit III	AMPLIFIERS & OSCILLATORS Principle of amplification - Classification of amplifiers - Common emitter single stage amplifier and frequency response - Multistage amplifiers (Basic ideas) - Concept of feedback and Effect of negative feedback (qualitative) - Barkhausen criterion - Basic Oscillatory circuit and Classification of oscillators - Hartley, Colpitts and Phase shift Oscillators (Circuit operations)	15
Unit IV	OPERATIONAL AMPLIFIER Typical stages of an Op Amp - Ideal Op Amp and characteristics - Input offset voltage, Offset current, Bias current and Slew rate (Definitions) - Inverting Op Amp - Noninverting Op Amp - Differential Op Amp - Scale and Phase changers - Adder and Averager – Subtractor, Differentiator and Integrator	15
Unit V	OPTOELECTRONIC DEVICES Optical radiation - Flux and illumination - Structure, variation of resistance & speed response of a Photo detector - Photovoltaic cells - Photodiodes - Phototransistors - Light beam detector - Electronic slave flash control - Window detector - LED: Bar graph display, drivers and LED arrays - <i>Optically coupled isolator (Basic ideas)</i>	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS5E1**Text Books**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James J.Brophy	Basic Electronics for Scientists	McGraw Hill Publishing Company, New York	1990
2	Sadasiva Biswal	Basic Electronics (Vol. I)	Atlantic Publishers and Distributors	2001
3	Swaminathan Mathu	Electronics: Circuits and Systems	Howard W.Sams & Co. Inc, New York	1985
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/122/106/122106025/ https://nptel.ac.in/courses/117/103/117103063/ https://nptel.ac.in/courses/108/101/108101091/			

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Narayana Rao B.V.	Principles of Electronics (Vol. I & II)	Wiley Eastern Limited & New Age International Limited, New York	1994
2	Norman Lurch	Fundamentals of Electronics	John Wiley & Sons	2010 (Reprint)
3	Ramakant A.Gayakwad	Op-Amps & Linear Integrated Circuits	PHI Learning Pvt. Ltd., New Delhi	1997

Designed by	Verified by HOD	Checked by CDC	Approved by COE
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Name: Dr. S.Shanmugapriya	Name: Dr. T.E. Manjulavalli	Name: Dr. T.E. Manjulavalli	Name: Dr.P.Maheswari
Signature:	Signature:	Signature:	Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS5E2			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	DSE I: Communication Electronics	Semester:	V
					Credits:	5

Course Objective

To provide fundamental knowledge of digital modulation techniques with the concepts of communication system and their applications

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental theories of electronic systems involved in communication	K1 / K2
CO2	Apply the knowledge of mathematical methods to resolve the components of digital communication system	K3
CO3	Analyze basic wireless transmission circuits using electronic devices and instruments	K4
CO4	Explain clearly the importance of transformation equations to convert signals from one domain to another in the field of digital communication	K5
CO5	Design and analyze the electronic circuit systems that are responsible for digital transmission using various simulation techniques	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	M	-	H	-

CO2	M	H	L	M	H	-	M	M
CO3	M	M	H	H	M	L	M	M
CO4	-	-	M	L	-	M	-	H
CO5	-	-	-	-	-	M	-	H

H – High; M – Medium; L – Low

Communication Electronics

Units	Content	Hrs
Unit I	SIGNAL ANALYSIS Fourier transform of gate functions, delta functions at the origin – Two delta function and periodic delta function – properties of Fourier transform – Frequency shifting – Time shifting – Convolution theorem – Frequency convolution theorem – Sampling theorem	15
Unit II	PULSE MODULATION AND COMMUNICATION Pulse amplitude modulation – Natural sampling -Instantaneous sampling Transmission of PAM signals – Pulse width modulation – Time division multiplexing and frequency division multiplexing – Band width requirements for PAM signals – Pulse code modulation – Principles of PCU – Quantizing noise – Generation and demodulation of PCM – Effects of noise – Advantages and application of PCM – Differential PCM (DPCM) – <i>Delta modulation</i>	15
Unit III	BROAD BAND COMMUNICATION Coaxial cable circuit -Parallel wire line circuit – Computer communication – Digital data communication – Modems – Microwave communication links – LOS links – Tropospheric scatter microwave links – Integrated Service Digital Network (ISDN) – Architecture – Broadband ISDN – Local Area Network (LAN) – LAN topologies – Private Branch Exchange (PBX)	15
Unit IV	SATELLITE COMMUNICATION Introduction – Communication satellite systems – Transmitting and receiving earth station – Satellite orbits – Satellite frequency bands – Satellite multiple access formats – FDMA – CDMA – Satellite channel, Power flow – Polarization antenna gain – Parabolic dish antenna – Power loss – Rainfall effect – Receiver noise –satellite system power budget: EIRP, received power Carrier to noise ratio, G/T ratio. – Satellite link analysis – Up link – Down link – Cross link – Direct Home TV broadcasting – <i>Satellite transponders</i>	15
Unit V	RADAR SYSTEMS AND OPTICAL FIBER Introduction, Basic Radar systems, Radar systems – Radar range – Pulsed radar system – A Scope – Plan Position Indicator (PPI) – Search Radar – Tracking Radar – Moving Target Indicator (MTI) – Doppler Effect – MTI principle – Digital MTI – Radar Beacons. Optical Fiber: Introduction to light, optical fiber and fiber cables, optical fiber characteristics and classification, losses, Fiber optic components and systems, Installation, testing and repair	15

	Total Contact Hrs	75
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- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS5E2

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Anokh singh & Chhabra A.K	Principle of communication engineering	S Chand and Co Ltd, New Delhi	2006

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert M.Ganliardi	Satellite Communication	CBS Publication New Delhi	2010
2	Arumugam M	Semiconductor Physics and Opto electronics	Anuradha Agencies, Kumbakonam	2006
3	Subir Kumar Sarkar	Optical Fibers and Fiber optical communication systems	S Chand and Co Ltd, New Delhi	2007
4	Lathi B.P	Communication systems	B.S.Publication	2001
5	Dennis Roddy and John Coolen	Electronic communications	Prentice Hall of India Pvt. Ltd, New Delhi	1998
6	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/117/101/117101051/ https://nptel.ac.in/courses/117/105/117105077/ https://nptel.ac.in/courses/106/106/106106129/			

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Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:
Programme Code:	B.Sc. PHY		Programme Title:
Course Code:	26UPS5E3		Title
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	Batch:
			Semester:
			Credits:

Course Objective

To acquire basic knowledge of atomic structure and binding conditions of atom in the materials.
 To acquire enveloping knowledge of physics, chemistry, metallurgy and mathematics to know wider field of materials science
 To provoke the students to pursue research in the field of materials science.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the physics behind the material formation and different properties of the solids.	K1, K2
CO2	Tailor the properties of solids materials with the adequate knowledge.	K3
CO3	Develop a new materials based on the fundamental understanding of the properties	K3
CO4	Evaluate the materials properties for the cutting-edge applications	K4
CO5	Design and analysis the experimental/materials strategies	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	M	H	L	H	M

CO2	H	H	H	L	M	L	H	M
CO3	H	M	M	M	M	L	M	M
CO4	M	H	M	H	M	L	L	M
CO5	H	M	H	M	M	M	M	H

H-High; M-Medium; L-Low;

Materials Science

Units	Content	Hrs
Unit I	Atomic Structure and Structure of Solids: Fundamental concepts- electrons in atoms-atomic models-Bohr atomic model-wave-mechanical model-quantum numbers-electron configurations-the periodic table: element classification and characteristics-atomic bonding in solids, Force - interatomic distance curve, structure - crystallographic directions, crystallographic planes, linear and planar densities, close-packed crystal structures, density computations—metals.	15
Unit II	Imperfection and diffusion of solids: Imperfections: vacancies and self-interstitials-impurities in solids-specification of composition. diffusion: definition- impurity diffusion, diffusion mechanisms- vacancy diffusion- interstitial diffusion- steady-state diffusion- non-steady-state diffusion- factors that influence diffusion- diffusion in semiconducting materials- dislocations—linear defects.	15
Unit III	Classifications of materials: Crystalline and non-crystalline materials: single crystals-polycrystalline materials- anisotropy- non-crystalline solids, classification of metal alloys: ferrous and non ferrous alloys, ceramics: structural features – types of ceramics—industrial ceramics like tungsten carbide, silica-alumina, zirconia, silicon carbide and sialons, composites: definition of composites - continuous and discontinuous fiber composites-polymer and matrix-based composites, classification of polymers: structure – property correlation – molecular weight – crystallinity in polymers.	15
Unit IV	Properties of materials: Mechanical properties: concepts of stress and strain, elastic deformation-plastic deformation, electrical properties: electrical and ionic conductivity, energy band structures in solids, electron mobility, electrical resistivity of metals-ferroelectricity-piezoelectricity, thermal properties: heat capacity-thermal expansion-thermal conductivity, magnetic properties: magnetic dipoles-magnetic hysteresis – magnetic domain – magnetostriction – para magnetism, optical properties: light interactions with solids-refraction-reflection-absorption-transmission-color.	15
Unit V	characterization of materials: Introduction, Structural characterization-X-ray diffraction, Laue's method, Bragg's law, determination of crystal structure with principle, construction and working. Microstructural characterization – electromagnetic lens system, determination of surface morphology by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM) with principle, construction, working. Microhardness testing –Determination of microhardness by Vickers hardness test and knoop hardness test with principle construction, working and formula.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS5E3**Text Book**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	William D. Callister, Jr., David G. Rethwisch	Materials science and engineering: an introduction	Wiley/Eight edition	2009
2	Dr. M. Arumugam	Material Science	Anuradha Publications, Chennai	1990

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	William D. Callister, David G. Rethwisch	Fundamentals of materials science and engineering : an integrated approach	Wiley/ third edition	2008
2	Sabar D. Hutagalung	Materials Science and Technolog	InTech	2012
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/113102080 https://nptel.ac.in/courses/112106293			

Designed by	Verified by HOD	Checked by CDC	Approved by COE
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Signature:	Signature:	Signature:	Signature:

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS510			Title	Batch:	2026 - 2029
				CC XIII:	Semester:	I
Lecture Hrs./Week or Practical Hrs./Week	-	Tutorial Hrs./Sem.	-	Internship	Credits:	2

Mark Split UP

CIA	CEE	Total
25	75	100

S. No	Components for CIA	Marks
1	Review – I *	5
2	Review – II *	5
3	Review – III *	5
4	Rough Draft Submission	10
Total		25

* Review includes Objectives and Scope, Research Methodology, Literature Review, Data Analysis and Results, Discussion and Interpretation, Recommendations and Implications, Presentation and Format, Creativity and Originality, and Overall Impact and Contribution.

S. No	Components for CEE	Marks
1	Evaluation*	50
2	Viva-Voce	25
Total		75

* Evaluation includes Originality of Idea, Relevance to Current Trend, Candidate Involvement, Thesis Style / Language, and Presentation of Report.

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS5AL1			Title	Batch:	2026 - 2029
				Advanced Learner Course - I - Problem Solving Skills in Physics I	Semester:	V
Lecture Hrs./Week		Tutorial Hrs./Sem.			Credits:	5

Course Objective

Student will be introduced to solve problems in core physics. Every unit must contain minimum 20 problems based on various principles of Physics.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Get motivated to acquire problem solving skills in Physics	K1/K2
CO2	Apply the skills to solve in Mechanics, Thermal Physics and Electricity	K3
CO3	Select and use appropriate concepts and methods to solve problems effectively and creatively	K4
CO4	Identify, evaluate and synthesize information and engage the imagination to explore new possibilities	K5
CO5	Crack problems confidently in competitive examinations like JEST, JAM& TIFR	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	M	M	L	H	H
CO2	H	H	M	M	M	L	H	H
CO3	H	H	M	M	M	L	H	H
CO4	H	M	M	M	H	L	H	H
CO5	H	M	M	L	H	L	H	H

H – High; M – Medium; L – Low

Problem Solving Skills in Physics I

Units	Content	Hrs
Unit I	MECHANICS Newton laws of motion for various systems (1, 2 and 3 dimension), Conservation laws and collisions, Rotational mechanics, central force, Harmonic oscillator, special relativity	20
Unit II	THERMAL PHYSICS Kinetic theory- MB distribution-Laws of thermodynamics–Ideal Gas law-Variou Thermodynamic process- Entropy calculation for various process-Heat engine-TS and PV diagram-Free energies various relations	15
Unit III	ELECTRICITY & MAGNETISM Electrostatics- calculation of Electrostatic quantities for various configurations- Conductors	10
	Total Contact Hrs	45

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
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1	Charles Kittel, Walter D knight (in SI units)	Mechanics (in SI units)	Tata McGraw Hill publication \ second edition	2017
2	S.C. Garg, RM Bansal & CK Ghosh	Thermal Physics	Tata McGraw Hill Publications\ first edition	1993
3	E.M.Purcell	Electricity & magnetism (in SI units)	Tata McGraw hill Publication\ second edition	1984

26UPS5AL1

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	H.C. Verma	Concepts of Physics Vol 1 & 2	Bharathi Bhavan Publications	2017
2	Halliday & Resnick	Fundamentals of Physics	Wiley Publications\ 8 th edition	2007
3	Nelkon and Parker	Advanced level Physics	CBS publishers\ 7 th edition	1995
4	AmithAgarwal	Play with Graphs	Arihant Publications\ 10 th edition	2018

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Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS5S3			Title	Batch:	2026 - 2029
				Skill based Elective III: Fundamentals of Astrophysics	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	-		Credits:	2

Course Objective

To explore the basic knowledge and recent aspects of Space science, Quasars and Cosmology

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the origin and destiny of universe, astronomy, stars, quasars, cosmology	K1
CO2	Acquire the fundamental ideas of observational astronomy, stars, white dwarfs, nature of black holes and big bang theory	K2
CO3	Implement the phenomena and processes associated with galaxy, stellar and formation of planetary systems, dark matter and energy	K3
CO4	Figure out the concept of red shift, expansion of universe, accelerating universe is essential for scientific and research applications	K4
CO5	Elucidate the origin of universe and various models based on cosmological principles	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	-	-	H	-
CO2	H	M	-	L	L	-	M	-
CO3	M	M	M	-	M	-	M	-
CO4	-	-	M	M	M	M	-	M
CO5	-	M	-	-	-	L	-	-

H – High; M – Medium; L – Low

Fundamentals of Astrophysics

Units	Content	Hrs
Unit I	OUR PLACE IN THE UNIVERSE A tour of the Universe – Scale and Contents: Planets, Stars, Galaxies, Light years and the Interstellar medium	6
Unit II	OBSERVATIONAL ASTRONOMY The Electromagnetic spectrum - Geometrical Optics: Ray Diagrams, Focal length, Magnification – Diffraction: Resolving Power, Airy Disc, Diffraction Limit – Telescopes: Reflecting, Refracting, Multi-wavelength.	9
Unit III	STARS Properties of stars – Stellar structure and Evolution – Introduction to supernovae – Stellar remnants – White dwarfs – Neutron stars – <i>Black holes</i>	7
Unit IV	QUASARS Constituents of Galaxies - General structure – Mass of the Galaxy – Cosmic Rays – External Galaxies: Classification and Spectra of Galaxy – <i>Active Galaxies and Quasars.</i>	11
Unit V	COSMOLOGY Red shift and Expansion of the Universe – Hubble's Law – The Age of the Universe – The Big Bang – Introductory to Cosmology: The Cosmological Principle, Homogeneity and Isotropy, Olber's Paradox – Introductory to Cosmological Models: Critical Density, Geometry of Space, The fate of the Universe – Dark energy and the Accelerating Universe.	12
	Total Contact Hrs	45

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Baidyanath Basu, Tanuka Chattopadhyay, Sudhindra Nath	An Introduction to Astrophysics	PHI Learning Private Limited. New Delhi	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abhyankar, K.D.	Astrophysics of the Solar System	University Press Limited. Hyderabad	1999

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr.V. Saravanan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS5S4			Title	Batch:	2026 - 2029
				Skill based Elective III: Fundamentals of Biophysics	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	-		Credits:	2

Course Objective

To develop the basic knowledge about Biophysics and its Applications

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge on the key principles of physics toward evaluating and analyzing the biological phenomenon.	K2
CO2	Apply the separation and physico-chemical techniques to study biological Structure	K3
CO3	Implement the characteristics of a biological system using the concept of physics and chemistry	K4
CO4	Explain the techniques and underlying concept of physics of Bio mechanics and Neuro- Biophysics	K4
CO5	Evaluate the physical and chemical properties of biological applications	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	L	-	-	M	-
CO2	H	M	L	M	-	M	M	-
CO3	-	-	-	-	M	-	-	L
CO4	H	H	L	M	-	-	M	M
CO5	-	-	-	-	M	L	-	-

H – High; M – Medium; L – Low

Fundamentals of Biophysics

Units	Content	Hrs
Unit I	LAWS OF PHYSICS AND CHEMISTRY Quantum Mechanics – Electronic structure of Atom – Molecular orbitals and Covalent bonds – Molecular Interactions – Strong and Weak interaction – Thermodynamics – Entropy and Enthalpy – <i>Free energy of a system</i>	3
Unit II	MOLECULAR ALPHABETS OF LIFE Introduction to the molecular structure and function of Proteins, Nucleic acids, Carbohydrates and Lipids.	3
Unit III	BIOMOLECULAR SEPARATION TECHNIQUES Chromatography: Column, Thin Layer, Ion exchange, Molecular exclusion and Affinity Chromatography – Electrophoresis – Gel Electrophoresis.	3
Unit IV	PHYSIOCHEMICAL TECHNIQUES Ultra centrifugation – Viscosity – Light scattering measurements – Different types of Light microscopy – Basics of TEM, SEM – Introduction to X-ray crystallography and NMR	3
Unit V	BIOMECHANICS AND NEURO-BIOPHYSICS Mechanical properties of muscles – Biomechanics of cardiovascular system – The nervous system – Physics of membrane potentials – Sensory mechanisms – The Eye – <i>Physical aspects of hearing.</i>	3
	Total Contact Hrs	15

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS5S2

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Vasanth Pattabhi, Gautham N	Biophysics	Narosa Publishing House. New Delhi	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Rodney Cotterill	Biophysics an Introduction	John Wiley & Sons Ltd, England.	2000

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS611			Title	Batch:	2026 - 2029
				CC VIII: Atomic & Nuclear Physics	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.			Credits:	5

Course Objective

To comprehend the structure and properties of electron and the nucleus

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire fundamental knowledge about the electronic and nuclear structure of atoms	K1
CO2	Understand the influence of X-rays, atomic and nuclear physics on modern scientific developments	K2
CO3	Apply the key strategies to investigate the atomic and nuclear physics that affects our everyday living	K3

CO4	Analyze techniques to examine and understand the processes within material industry and medical applications of nuclear phenomena	K4
CO5	Evaluate properties of elementary particles, associated symmetries, conservations and models	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	L	-	M	-	H	-
CO2	H	M	M	M	M	L	H	-
CO3	L	H	M	L	M	-	M	L
CO4	-	M	H	M	M	L	M	M
CO5	-	L	M	H	M	H	-	M

H-High; M-Medium; L-Low

Atomic & Nuclear Physics

Units	Content	Hrs
Unit I	STRUCTURE OF THE ATOM Introduction to Atom Models - Sommerfeld's Relativistic Atom Model - Sommerfeld's Relativistic Theory - Fine Structure of H_{α} line - The Vector atom Model - Quantum Numbers associated with the vector atom model - Coupling Schemes ATOMIC SPECTRA Zeeman Effect - Lorentz classical theory of Zeeman Effect- Expression for the Zeeman Shift - Larmor's Theorem - Quantum Mechanical explanation of the Normal Zeeman Effect - Paschen-Back Effect	15
Unit II	X -RAYS Origin of X rays - Production & detection - Properties - Diffraction of X rays (Laue spots) - Bragg's Law - Bragg's X ray Spectrometer - Determination of crystal structure by Powder crystal method - Continuous and Characteristic X ray spectrum - Mosley's Law and significance - Theory of Compton Scattering - Experimental verification - Applications of X rays (Basic ideas) PHOTOELECTRIC EFFECT Introduction- Experimental investigations - Einstein's photoelectric equation - Millikan's experiment	15
Unit III	NUCLEAR MODELS Properties of nucleus - Binding energy of the nucleus and packing fraction - Nuclear stability - Nuclear models: Liquid drop model and Semi empirical mass formula - Shell model (Qualitative ideas). RADIOACTIVITY Natural radioactivity- The law of radioactive decay and decay rate - Half life and Mean life - Alpha decay: Determination of charge of the α particle- Range of α particles-	15

	Geiger – Nuttall law- Beta decay: Beta ray spectrum – Pauli’s neutrino hypothesis -Non conservation of parity in Beta decay- Gamma decay: Origin of Gamma rays- Internal conversion.	
Unit IV	NUCLEAR REACTIONS, DETECTORS AND ACCELERATOR Nuclear reaction energy - Reaction cross section - Nuclear fission - Energy released in fission of U235 - Chain reaction - Fission reactor - Nuclear fusion - Fusion reaction - Advantages and problems of fusion. Ionization chamber: Simple Ionization chamber - Proportional counter - GM counter - Scintillation counter - Linear accelerator – Cyclotron.	15
Unit V	ELEMENTARY PARTICLES AND COSMIC RAYS Fundamental forces in nature - Classification of elementary particles based on interactions - Conservation laws - Strange particle and Strangeness - Quarks - Quark model - Cosmic rays - Primary and Secondary cosmic rays - Cosmic ray showers - Positron - Pair production - Annihilation of matter - Mesons - Origin of cosmic rays.	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS611

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Murugesan R,	Modern Physics	S. Chand and Company Ltd, 14th edition, New Delhi,	2009
2	Raymond A. Serwey, Clement J. Moses & Curt Moyer,	Modern Physics	. 2nd edition, Saunders College Publishers	2007
3	Atam P.Arya,	Elementary Modern Physics	Addition – Wesley publishing Company,	2014
4	Rajam J.B. Prof.Louis De Broglie,	Atomic Physics	Sultan Chand & Sons, New Delhi,	2000

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Atam P.Arya,.	Elementary Modern Physics	1st edition, Addison Wesley	1974
2	Sehgal Chopra,.	Modern Physics	9th edition Sultan Chand &	2004

			Sons, New Delhi	
3	Pandya M.L. YadAv R.P.S,	Elements of Nuclear Physics	5th editions, KedarNath RamNath Publications	2008
4	Tayal D. C.	Nuclear Physics	4th edition, Himalaya Publishing House Publishers, New Delhi	1987
Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://youtu.be/josqjCH79PE https://youtu.be/3lTQqEehEhI https://youtu.be/IsaTx5-KLT8				

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS612			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.		CC IX: Solid State Physics & Statistical Mechanics	Semester:	VI
					Credits:	5

Course Objective

To study the basic theory of crystal structure, composition and physical properties of crystalline materials. Study the electrical and magnetic properties of solids through classical and quantum statistics

Course Outcomes

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

CO No.	Course Outcome Statement	PO Mapping
CO1	Explain the structural, electrical, magnetic, thermal and statistical behavior of solids based on crystallography, bonding, lattice vibrations, superconductivity and statistical thermodynamics	PO1
CO2	Apply the fundamental concepts of crystallography, atomic bonding and lattice vibrations with the electrical and magnetic behavior of solids, and apply the principles of superconductivity and statistical thermodynamics to understand the physical properties of materials.	PO1,PO3,PO4

CO3	Analyze the crystal structure, bonding mechanisms, lattice dynamics, electrical conduction, magnetic properties, superconductivity, and statistical thermodynamics to interpret and predict the physical behavior of solid materials	PO3,PO5,PO8
CO4	Evaluate the suitability and performance of materials for engineering applications based on their structural, electrical, magnetic, superconducting, and thermodynamic characteristics.	PO3,PO8
CO5	Design solid-state materials for specific applications by integrating the concepts of crystallography, bonding, lattice dynamics, electrical conduction, magnetism, superconductivity, and statistical thermodynamics	PO10,PO15

Correlation Level: 3 – High | 2 – Medium | 1 – Low

CO–PO Mapping Matrix (UGC – B.Sc. Programme Outcomes)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	2	-	-	2	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2

Solid State Physics & Statistical Mechanics

Units	Content	Hrs
Unit I	BASICS OF CRYSTALLOGRAPHY: Crystalline solids: Periodic array of atoms – unit cell and primitive lattice cell-symmetry elements: rotation axis of symmetry, Mirror plane, inversion centre – twenty three symmetry elements in a cube crystal –Bravais lattice (2D and 3D), PF for SC,BCC,FCC and HCP)- other cubic structures – Lattice plane and Miller Indices – interplanar distance of lattice planes – Reciprocal lattice –X-rays – Bragg’s law - Experimental method in X-ray diffraction - powder method - problems.	15
Unit II	BONDING AND LATTICE VIBRATIONS Types of bonds- Ionic bonding –Energy of formation of NaCl molecules – PE diagram of ionic molecules – covalent bond –Metallic bond – Molecular bond –Hydrogen bonding - Elastic vibration of continuous media – Group velocity –Phase velocity – wave motion in one dimensional atomic lattice (qualitative) –phonons – Classical theory of lattice specific heat – Einstein and Debye theories of specific heat of solid – T^3 law (Qualitative only) - thermal expansion.-problems	15
Unit III	ELECTRICAL CONDUCTION IN SOLIDS: Drude Lortenz free electron theory – Electrical resistivity vs temperature, Fermi-Dirac Distribution – electron gas – Energy spectra in atoms, molecules and solids – electrical and thermal conductivity – Weidemann – Franz law- Kronig –Penney model (qualitative) – Motion of electron in periodic potential – physical meaning of effective mass - Construction of Brillouin Zone in 2D – Distinction between metal, insulator and semiconductor- Hall effect.- Problems	15

Unit IV	MAGNETIC PROPERTIES OF SOLIDS AND SUPERCONDUCTIVITY: Classification of magnetic materials - Langevins classical theory of diamagnetism and paramagnetism- Origin of permanent magnetic moment –Curie –Wiess law-Wiess theory of ferromagnetism – Ferromagnetic domains – discussion of B-H curve – hysteresis and energy loss-soft and hard magnets – Superconductivity: Effect of critical field – Meissner effect – London equation and Penetration depth– Type I and II superconductors – isotope effect – Energy gap – BCS theory of superconductors (Qualitative) – tunneling effect– Problems.	15
Unit V	STATISTICAL THERMODYNAMICS Probability - Basic rules of probability theorem – Macro state and micro state – thermodynamic probability – constraints on a system – static and dynamic states Most probable state – Life time of a macro and micro state – concept of a cell in a compartment - Statistical equilibrium – Probability theorem in statistical thermodynamics– Maxwell’s Boltzmann distribution law- Maxwell’s Boltzmann distribution in terms of temperature – Maxwell quantum statistics – phase space – Fermi-Dirac distribution law – Bose Einstein distribution law – Comparison of three statistics- problems	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods: Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS612

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.L Gupta and V.Kumar	Solid state Physics	K.Nath and Co -10 th Edition	2018
2	Pillai S.O.	Solid State Physics.	New age international (P) Ltd, New Delhi, 10 th Edition,	2023
3	Rita John	Solid State Physics	Tata Mc Graw-Hill Education –I st Edition	2014
4	R. Ashokamani	Solid State Physics: Principles and Applications	Anshan - I st Edition	2006
5	Brijlal N Subrahmanyam P.S. Hemne	Heat Thermodynamics and Statistical Physics and applications	S. Chand -2 nd Edition	2018
6	R. Murugesan Er. Kiruthiga Sivaprasath	Thermal Physics	S. Chand	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Agarwal B.K. & Eisner.M,	Statistical Mechanics.	Wiley Eastern Ltd, Bangalore,-2 nd Edition	1998
2	Serway R. Moses C. Moyer C.A.	<i>Modern Physics.</i>	3 rd edition, Saunders college publishers,	2005
3	M.A Wahab	Solid State Physics	Narosa Publishing House- 2 nd Edition	2010
4	C. Kittel	Introduction to solid state physics	Wiley Indina-8 th edition	2005
5	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://youtube.com/playlist?list=PLFW6lRTa1g83HGEihgwcY7KeTLUuBu3WF https://youtube.com/playlist?list=PLbMVogVj5nJRjLrXp3kMtrIO8kZl1D1Jp https://youtube.com/playlist?list=PL090DAFDD7A36E27B https://youtube.com/playlist?list=PLgMDNELGJ1CYJka07IYfNgSgno3OES8Wt https://youtu.be/x9nbogX1Ie0 https://youtu.be/na6mYwzIuhM			

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS6E4			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	-	DSE II: Digital Circuit systems & Microprocessor	Semester:	VI
					Credits:	5

Course Objective

To be acquainted with the number system, logic circuits and internal architecture of 8085 microprocessor

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
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CO1	Understanding the difference between analog and digital signals and be familiar with the number systems and logic gates	K1
CO2	Demonstrate the ability to use basic Boolean laws and theorems	K2
CO3	Analyze hazards in logic circuits and provide solution for them	K3
CO4	Apply the knowledge to design Flip flop and counters	K4
CO5	Familiarize the internal architecture of 8085 microprocessor	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	M	M	L	H	H	M
CO2	M	H	H	H	H	M	H	M
CO3	M	H	H	H	H	H	H	M
CO4	M	M	H	M	M	H	H	M
CO5	H	H	M	H	M	M	H	M

H – High; M – Medium; L – Low

Digital Circuit systems & Microprocessor

Units	Content	Hrs
Unit I	NUMBER SYSTEMS AND CODES Binary numbers - 1's and 2's complement - Addition - Subtraction - Multiplication – Division - Binary to Decimal conversion and vice versa - Octal numbers - Octal to Binary conversion and vice versa - Hexadecimal numbers - Hexadecimal to Binary conversion and vice versa - BCD - ASCII LOGIC GATES Basic gates (OR, AND and NOT gates) - Universal building blocks (NAND and NOR gates) - XOR and XNOR gates	15
Unit II	THEOREMS OF BOOLEAN ALGEBRA & KARNAUGH MAP Demorgan's theorems - Laws and theorems of Boolean algebra - Simplification of Boolean expressions using Boolean laws and theorems - Karnaugh map – Simplification of expressions using pairs, quads and octets - Sum of product method and simplifications - Don't care conditions - Product of sum method and simplifications	15
Unit III	ARITHMETIC PROCESSING CIRCUITS Half and full adders - Half and full subtractors - Parallel binary adder and subtractor data	15

	Processing circuits. DATA PROCESSING CIRCUITS Multiplexers - Demultiplexers - 1 - of - 16 decoder - BCD to decimal decoder – Seven segment decoders - Encoders	
Unit IV	FLIP FLOPS , SHIFT REGISTERS RS Flip Flop - D Flip Flop - Edge triggering - JK and Master slave Flip Flop - Serial in serial out - Serial in parallel out - Parallel in serial out - Parallel in parallel out shift register COUNTERS Asynchronous Mod 8 up and down counters - Decoding gates - Synchronous Mod 8 up and down counters - Mod 3, Mod 5 counters	15
Unit V	MICROPROCESSOR ARCHITECTURE AND PROGRAMMING Organization of a Microcomputer system – Architecture of the 8085 - Microprocessor instruction set and computer languages - Overview of the 8085 instruction set: Data transfer, Arithmetical, Logical, Branch, Stack, I/O & Machine control groups – Addressing modes - Programming the 8085: The programming process - The stack and subroutines - Simple programming examples	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS6E4

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Malvino A.P, Leach D.P.	Digital Principles and Applications	Tata Mc Graw Hill Publishing Company Ltd., New Delhi \ 7th Edition	2011
2	Ramesh S.Gaonkar	Microprocessor Architecture Programming & Applications with the 8085	Penram International Publishing, New Delhi. 6 th Edition	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jacob Millman, Halkias C.	Integrated Electronics	Mc Graw Hill Publishing Company \ 1st Edition	1985
2	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/117106114 https://nptel.ac.in/courses/108105113			

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. M. Karthika Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS6E5			Title	Batch:	2026- 2029
				DSE II:	Semester:	VI
Lecture Hrs./Week	5	Tutorial Hrs./Sem.	-	Biomedical Instrumentation	Credits:	5

Course Objective

To familiarize with the use of medical instruments and gain the knowledge in operation of modern biomedical instruments

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the structure of cell, physiology of different biological systems and their functions.	K1
CO2	Illustrate the types of electrodes and measurements of biological parameters.	K2
CO3	Explain the working of diagnostic instruments, therapeutic instruments and imaging systems.	K3
CO4	Analyse the different methods of measurements of biological parameters.	K4
CO5	Compare the different techniques of measurement in medical field.	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	H	H
CO2	H	M	L	H	M	H	H	H
CO3	H	M	M	L	H	H	M	M
CO4	H	M	M	M	H	M	H	M
CO5	H	M	L	H	H	H	M	H

H – High; M – Medium; L – Low

Biomedical Instrumentation

Units	Content	Hrs
Unit I	ELECTRO PHYSIOLOGY Cell-and Its Structure - Electrical, Mechanical and Chemical Activities - Action and Resting Potential- Organization of Nervous System - CNS - PNS - Neurons - Axons- Synapse - Propagation of Electrical Impulses along the Nerve-Sodium Pump - <i>Cardio Pulmonary System - Physiology of Heart, Lung, Kidney.</i>	15
Unit II	BIO POTENTIAL ELECTRODES AND TRANSDUCERS Design of Medical Instruments - Components of Biomedical Instrument-System - Electrodes: Micro Electrodes, Needle Electrodes, Surface Electrodes - Instrumentation amplifier - Biomedical Measurements Like pH, PCO ₂ , PO ₂ of Blood, Isolation	15

	Amplifier, Preamplifier, Current Amplifier, Chopper Amplifier.	
Unit III	INSTRUMENTS USED FOR DIAGNOSIS ECG, Einthoven Triangle, Leads, Electrodes, Vector Cardiograph, Measurement of Cardiac Output, EEG, EMG, Plethysmography, Blood Flow Measurements, Holter Monitor - Respiratory Rate Measurement - Oximeter, Bone Density Measurement, Patient Monitoring System, ICCU.	15
Unit IV	MODERN IMAGING SYSTEM Ultrasonic Diagnosis, Ultrasonic Scanning, Isotopes in Medical Diagnosis- Pace Makers, Defibrillators, Doppler Monitor(colour), Medical imaging - X-ray generation, DXA, Radiographic & Fluoroscopic Techniques - Image Intensifiers- Computer Aided Tomography, PET, SPECT - Laser Applications - Echocardiography - CT Scan Qualitative and Quantitative - <i>MRI/ NMR - Endoscopy.</i>	15
Unit V	RECENT TRENDS AND INSTRUMENTS FOR THERAPY Dialysers - Surgical Diathermy - Electro Anaesthetic and Surgical Techniques. Sources of Electric Hazards and Safety Techniques. Single Channel Telemetry, Multi channel Telemetry, Implantable Telemetry, Wireless Telemetry, Telemedicine, Telemedicine Applications.	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

26UPS6E5

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Khandpur	Handbook of Biomedical Instrumentation	Tata McGraw Hill	2003

2	Arumugam M.	Biomedical Instrumentation	Anuradha Publications	2009
3	Tompkins W.J. Webster J.G.	Design of Microcomputer Based Medical Instrumentation	Prentice Hall	1991

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Geddes L.A. Baker L.E	Principle of Applied Biomedical Instrumentation	Wiley	1989
2	Hill D.W.	Principle of Electronics for Medical Research	Butterworths	1965
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/102105090			

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. A. G. Kannan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS6E6			Title	Batch:	2026- 2029
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.		DSE II: Nanomaterials and applications	Semester:	VI
					Credits:	5

Course Objective

To lay foundation of Nano science and Nanotechnology.

To provide the fundamental knowledge of nano materials, their synthesis and fabrication, properties and applications.

To provoke the students to pursue research in the field of nanomaterials

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental of nanomaterials and nanotechnology	K1,K2
CO2	Synthesize nanomaterials using various physical and chemical methods	K3
CO3	Tune the size and shape of the nanomaterials for diverse applications	K4
CO4	Evaluate the properties of nanomaterials and defects nature of the materials	K4
CO5	Design nano materials-based devices and analysis their performance	K4,K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	L	M	M	L	M	L
CO2	M	H	M	M	L	H	H	M
CO3	H	H	H	H	M	H	H	H
CO4	M	M	M	H	H	M	M	H
CO5	M	M	L	M	H	L	L	M

H-High; M-Medium; L-Low

Nanomaterials and applications

Units	Content	Hrs
Unit I	Basic Concepts of Nanoscience: Nanoscience- Nanotechnology-Nanomaterials definitions - Classification of carbon nanostructures- Allotropes, dimensions (one, two, three, and zero dimension), confinement-Surface to volume ratio-Energy at bulk and nano scale- Nature Nanophenomena- types of nanotechnology – Molecular	15

	Nanotechnology – Molecular and atomic size – Surface and dimensional space.	
Unit II	Nano Materials: Classification of Nano structured materials – Present and potential with significant technological impact – Industrial in nano materials – Fullerenes and nano tubes – Metals and inorganic – Fundamental issues in nano materials. Introduction to polymer nanocomposites: Basic materials for polymer nanocomposite	15
Unit III	Nano Properties: Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology	15
Unit IV	Nano Materials Synthesis: Basic approaches of synthesis nanomaterials – Bottom up and top down process – fundamental of sol – gel process – Mechanical milling – thermal evaporation– Liquid solid reactions – Gas phase synthesis of nano materials – Chemical vapour condensation (CVC) – Microwave plasma processing – Laser ablation – vapour liquid – solid growth .	15
Unit V	Application of Nanomaterials: Implications of Drug delivery – Polymeric Nanoparticles as Drug carriers and controlled release implant devices – Magnetic Data Storage – Magneto optics and magneto – optic recording – Nano Sensors – Physical sensor and chemical sensors.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan	Nanoscale Science and Technology	John Wiley & Sons Ltd,	2005
2	T. Pradeep,	NANO:The Essentials- Understanding Nanoscience and Nanotechnology,	McGraw Hill Education (India) Private Limited,	2018
3	M.F.Ashby, P.J. Ferreira, Daniel L.,	Nanomaterials, Nanotechnologies and Design	Elsevier Publications	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Masuo Hosokawa, Kiyoshi Nogi, Makio Naito, Toyokazu Yokoyama,	Nanoparticle Technology Handbook,	Elsevier Publications,	2007
2	K K Chattopadhyay, Arghya Narayan Banerjee,	Introduction to Nanoscience and Nanotechnology,	PHI Learning	2009
3	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://youtu.be/S-SOEBTplOM https://youtu.be/Ds_rzoyyfF0 https://youtu.be/M8d3pxVb4c4 https://youtu.be/ebO38bbq0_4			

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS6E7			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		DSE III: C Programming & Information Security	Semester:	VI
					Credits:	4

Course Objective

To develop the skill to gain knowledge in Programming in C & Information Security

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of C programming and information security	K1/K2
CO2	Apply the concepts of C programming to solve problems in Physics	K3
CO3	Analyze the importance of operators, control statements, functions, structures and pointers in problem solving	K4
CO4	Evaluate the impact of various types of attacks on information leakage and security	K5
CO5	Create the advance perspectives on prevention through cyber-crime of wireless digital communications including internet and e-commerce	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H
CO2	M	H	H	H	H	M	H	H
CO3	M	H	H	H	M	M	H	H
CO4	-	M	M	H	M	M	M	H
CO5	-	L	M	M	M	H	-	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	INTRODUCTION TO C Basic Structure of C Programs - Character set - Key words and Identifiers - Constants - Variables - Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants - Arithmetic operators - Relational operators - Logical operators - Assignment operators - Increment and decrement operators - conditional operators - Precedence of operators - <i>Formatted input & output statements</i>	12
Unit II	CONTROL STRUCTURES, ARRAYS & STRINGS Simple if - if...else - Nesting of if...else - else if ladder - Switch - while - do...while - for statements - Declaration and initialization of one & two dimensional arrays - Declaring and initializing string variables - String handling functions	12
Unit III	FUNCTIONS, STRUCTURES AND POINTERS Definition of functions - Return values and their types - Category of functions: No arguments and no return values - Arguments but no return values - Arguments with return values - Recursion - Defining a structure - Declaring structure variables - Accessing structure members - Structure initialization - Declaring and initializing pointers - Pointers as function arguments - Pointers and structures	12
Unit IV	INFORMATION SECURITY - I Components of Communications System – Transmission Media. Protocol – Definition – Introduction to TCP / IP – Wireless Network – Basics of Internet. Types of Attack: Phishing, Spoofing, Impersonation, Dumpster diving – Information Security Goals. Information Security Threats and Vulnerability: Spoofing Identity, Tampering with data, Repudiation, Information Disclosure, Denial of Service, Elevation of Privilege.	12
Unit V	INFORMATION SECURITY - II Authentication – Password Management – E-Commerce Security – Windows Security. Network Security: Network Intrusion and Prevention Systems – Firewalls – Software Security. Web Security: User authentication, Authentication – Secret and Session Management, Cross Site Scripting, Cross Site Forgery, SQL Injection. Computer Forensics – <i>Steganography</i> .	12
	Total Contact Hrs	60

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

26UPS6E7

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
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1	E.Balagurusamy	Programming in Ansi C (Units I-III)	Tata McGraw Hill	2017
2	Michael E. Whitman, Herbert J. Mattord	Principles of Information Security (Units IV & V)	Course Technology 20 Channel Center Boston, MA 02210	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ravichandran.D	Programming In C	New Age International Publishers	2011
2	Yashvant Kanetkar	Let Us C	BPB Publications	2016
3	Jason Andress	The Basics of Information Security	Syngress; 1st edition	2011
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] https://nptel.ac.in/courses/106104128 https://nptel.ac.in/courses/106106129			

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS6E8			Title	Batch:	2026 - 2029
				DSE III:	Semester:	VI
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	-	Industrial Instrumentation	Credits:	4

Course Objective

To make the student familiar with measurement techniques of physical quantities and analyze the data

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the principles of instruments used in different industrial sectors	K1
CO2	Elucidate the construction and working of various industrial devices in measuring physical quantities	K2
CO3	Analyze the performance and characteristics of each instrument	K3
CO4	Make the new models for calibration and configuration of instruments	K4
CO5	Formulate the instruments for specific applications in industries	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	M	H	M	L	H	H
CO2	H	H	L	H	M	H	H	H
CO3	H	M	M	H	H	H	M	M
CO4	H	H	M	H	M	H	M	M
CO5	H	M	L	M	H	H	M	H

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	INDUSTRIAL MEASUREMENTS Measurement of straightness, flatness, roundness and roughness. Force Measurement - Load cell, different types of load cells - elastic load cell-strain gauge load cell. Torque measurement-Using strain gauge and magneto elastic principle, Speed Measurement - Revolution counter-capacitive tacho-drag up type tacho, D.C and A.C tacho generators – stroboscopic methods. Acceleration Measurement- <i>Elementary accelerometer, Seismic accelerometer, Practical accelerometers.</i>	15
Unit II	TEMPERATURE MEASUREMENT & APPLICATION Definition & Standards, Temperature scales, Calibration of thermometers, Bimetallic thermometer, filled- in Thermometers, Vapour pressure thermometers, Resistance thermometers, Thermistors- color code testing and installation procedure, Thermostat, Thermocouples - types and ranges, characteristics, laws of thermocouples, cold junction compensation, IC temperature sensors AD 590, <i>Pyrometers - radiation and optical pyrometers.</i>	15
Unit III	PRESSURE MEASUREMENT Manometers - different types of manometers, Elastic pressure transducers, Dead weight Tester, Electrical types, Vacuum gauges - McLeod gauge, Knudsen gauge, Thermocouple gauge, Ionization gauge, Differential pressure Transmitter - electrical & pneumatic types, Complete air supply system for pneumatic control equipment and the different components and their function.	15
Unit IV	MEASUREMENT OF FLOW & LEVEL Orifice, Venturi, Pitot tube, flow nozzle rotameter, Dahltube, Positive displacement meter, Turbine flow meter, Electromagnetic flow meter, Ultrasonic flow meter, Open channel flow measurement, Solid flow measurement. Level: Sight glass, float gauge, displacer, torque tube, bubble r tube, diaphragm box, Differential Pressure methods, electrical methods resistance type, capacitance type, ultrasonic level gauging.	15
Unit V	MEASUREMENT OF DENSITY, VISCOSITY, HUMIDITY Hydrometer - continuous weight measurement, liquid densitometer - float principle, air pressure balanced method, using gamma rays - gas density measurements – gas specific gravity measurements - Viscosity terms, saybolt viscometer, rotometer type viscometer, Industrial consistency meters. Humidity terms - dry & wet bulb psychrometers - hot wire electrode type hygrometer, electrolytic hygrometer, Dew point hygrometer.	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Chalk and Talk lectures, Group Discussion, Seminar, Interaction, power point presentation

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patranabis D.	Principles of Industrial Instrumentation	Tata McGraw Hill, New Delhi	2009
2	Singh. S.K.	Industrial Instrumentation & Control	Tata McGraw Hill, New Delhi	2009
3	Krishnaswamy. K Vijayachitra. S	Industrial Instrumentation	New age International	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ernest O. Doebelin, Dhanish. N. Manik	Measurement Systems Application & Design	TMH	2004
2	Jain R.K	Mechanical & Industrial Measurements	Khanna Publishers	2004

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. K.Somasundaram Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

				Title:		
Course Code:	26UPS6E9			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	-	DSE III: Python Programming	Semester:	VI
					Credits:	4

Course Objective

To provide fundamental knowledge of Python programming and create the ability to interpret physics oriented problems using Python

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics, structure and functions of Python programming as useful scripting language	K1 / K2
CO2	Plan to write the algorithm of a program with the knowledge of mathematical operators, logical operators, conditional and looping statements	K3
CO3	Categorize various statements of Python programming into the lists and tuples	K4
CO4	Explain clearly the importance of different function statements and pass the arguments between functions	K5
CO5	Implement and compile the python programming for application in the field of Physics	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	M	-	-	M	-	H	-
CO2	H	H	L	-	H	-	M	M
CO3	M	M	H	M	M	L	M	M
CO4	-	L	M	H	L	M	-	H
CO5	-	-	-	M	-	M	-	H

H – High; M – Medium; L – Low

Python Programming

Units	Content	Hrs
Unit I	INTRODUCTION TO PYTHON LANGUAGE History of Python – features – command Line Arguments - Parsing Command Line Arguments - Python basics – statement and syntax – Identifiers – comments in Python - Basic style guidelines	15
Unit II	VARIABLE TYPES AND BASIC OPERATORS Assigning Values to Variables – Standard Data Types - Python Numbers – Python Strings - Python Lists - Python Tuples - Python Dictionary - Data Type Conversion - Types of Operator - Arithmetic Operators - Comparison Operators - Assignment Operators - Bitwise Operators - Logical Operators - Membership Operators - Identity Operators - Operators Precedence	15
Unit III	STRING OPERATORS Sequences: Strings, Lists and Tuples – Sequences – Strings and strings operators – String built-in methods – Lists – List type Built in Methods – Tuples	15
Unit IV	CONDITIONAL AND LOOPING STATEMENT Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter () function	15
Unit V	PYTHON FUNCTIONS Functional Programming – Functions – calling functions – creating functions – passing functions – Built-in Functions: apply(), filter(), map() and reduce() – Programming using functions	15
	Total Contact Hrs	75

- *Italic font denotes self-study*

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Wesley J. Chun	Core Python Programming	Pearson Education Publication	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Nageshwara Rao	Core Python Programming	Wiley Publication	2018
2	John V Guttag	Introduction to Computation and Programming Using Python	Prentice Hall	2013
3	Kenneth A. Lambert	Fundamentals of Python – First Programs	CENGAGE Publication	2016
4	Related online contents [MOOC, SWAYAM, NPTEL, Websites etc] www.python.org			

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Name: Dr. K.Somasundaram Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS6AL2			Title	Batch:	2026 - 2029
Lecture Hrs./Week		Tutorial Hrs./Sem.		Advanced Learner Course - II - Problem Solving Skills in Physics II	Semester:	VI
					Credits:	5

Course Objective

Student will be introduced to solve problems in core physics. Every unit must contain minimum 20 problems based on various principles of Physics.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Get motivated to acquire problem solving skills in Physics	K1/K2
CO2	Apply the skills to solve in Magnetism, Quantum Mechanics, General Physics etc	K3
CO3	Select and use appropriate concepts and methods to solve problems effectively and creatively	K4
CO4	Interpret and use written, quantitative, and visual text effectively in presentation of solutions to problems	K5
CO5	Crack problems confidently in competitive examinations like JEST, JAM & TIFR	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	H	M	M	L	H	H
CO2	H	H	M	L	M	L	H	H
CO3	H	H	M	M	M	L	H	M
CO4	H	M	M	M	H	L	H	H
CO5	H	M	M	L	H	L	H	H

H – High; M – Medium; L – Low

Problem Solving Skills in Physics II

Units	Content	Hrs
Unit I	MAGNETISM Magneto statics- Calculation of Magnetic quantities for various configurations, Electromagnetic induction, Poynting vector, Electromagnetic waves.	10
Unit II	QUANTUM MECHANICS Fundamental Principles of Quantum mechanics - potential wells and harmonic oscillator- Hydrogen atom.	20
Unit III	GENERAL PHYSICS & MATHEMATICS Plotting the graphs for various elementary and composite functions-Elasticity-Viscosity and surface tension- fluids-Buoyancy-pressure-Bernoulli's theorem-applications-waves and oscillations, Errors and propagation of errors.	15
	Total Contact Hrs	45

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.M. Purcell	Electricity & magnetism (in SI units)	Tata McGraw hill Publication\ second edition	1984
2	N. Zettili	Quantum mechanics	Wiley Publishers\ second edition	2009
3	David. J. Griffith	Introduction to quantum mechanics	Pearson Publications\ second edition	2015
4	D.S. Mathur	Properties of matter	S. Chand Publications\ 11 th Edition	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	H.C. Verma	Concepts of Physics Vol 1 & 2	Bharathi Bhavan Publications	2017
2	Halliday & Resnick	Fundamentals of Physics	Wiley Publications\ 8 th edition	2007
3	Nelkon and Parker	Advanced level Physics	CBS publishers\ 7 th edition	1995
4	Amith Agarwal	Play with Graphs	Arihant Publications\ 10 th edition	2018

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Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS613			Title	Batch:	2026 - 2029
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	-	CC Lab III: Electronics Lab	Semester:	V & VI
					Credits:	3

Course Objective

To provide a basic knowledge in the field of Electronics and to familiarize their operations

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles of Electronics	K1/K2
CO2	Apply the principle in circuit designing	K3
CO3	Analyze the characteristics of transistor, FET and Op-amp	K4
CO4	Evaluate the working of Electronic devices	K5
CO5	Design circuits and verify its operation	K6

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	M	H	M	M	H	H
CO2	M	H	M	H	H	H	H	H
CO3	M	M	H	H	H	H	H	H
CO4	M	H	M	M	H	H	H	H
CO5	M	H	M	M	H	H	H	H

H – High; M – Medium; L – Low

Electronics Lab

List of Experiments (Any fifteen):

1. Verification of Thevenin's theorem
2. Verification of Norton's theorem
3. Verification of Maximum power transfer theorem
4. Rectifier diode and Zener diode characteristics
5. Rectifiers and Filters
6. Voltage doubler
7. Two pin regulated power supply
8. Measurement of Band gap energy of Semiconductors
9. Transistor characteristics - Common Base mode
10. Transistor characteristics - Common Emitter mode
11. UJT – characteristics
12. Transistor voltage amplifier - Single stage
13. Hartley Oscillator
14. Square wave generator using 555 IC
15. Astable Multivibrator
16. Inverting and Non-inverting Operational amplifiers
17. Adder and Subtractor using Operational amplifiers
18. CRO Familiarization

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Paul B.Zbar, Malvino, Miller,	Electronics: A Text- Lab Manual	Mc.Graw Hill	2001
2	Woollard G	Practical Electronics	Mc.Graw Hill	1984
3	Bhargowa N.N	Basic Electronics and Linear Circuits	Tata Hill Publishing Co. Ltd.	1984

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Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Physics	
Course Code:	26UPS614			Title	Batch:	2026 - 2029
				CC Lab IV: Digital & Microprocessor Lab	Semester:	V & VI
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	-		Credits:	3

Course Objective

To be acquainted with the basics and working of Electronic Digital circuits and Microprocessor.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the operation of various logic gates	K1
CO2	Design logic circuits using De-Morgan's theorems	K2
CO3	Construct a Half, Full and Parallel binary adder/subtractor using basic Boolean laws and theorems	K3
CO4	Analyze hazards in logic circuit and provide solution for them	K4
CO5	Familiarize the internal architecture of 8085 microprocessor through simple programmes	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	H	H	M	H	M	H	H	M
CO2	H	H	M	H	M	H	H	-
CO3	H	M	M	H	L	H	H	M
CO4	M	H	M	H	L	H	M	M
HCO5	H	H	H	H	M	H	H	H

H – High; M – Medium; L – Low

Digital & Microprocessor Lab

List of Experiments (Any fifteen):

1. Study of Various logic gates using ICs and basic logic gates using discrete components
2. Study of NAND and NOR as Universal building blocks
3. Microprocessor - Addition and Subtraction
4. Construction and Study of Half and Full adders
5. Verification of Demorgan's theorems and problem solving through logic circuits
6. Microprocessor - 1's and 2's complement
7. Construction and Study of Half and Full Subtractors
8. Construction and Study of RS, D and JK flip-flops
9. Microprocessor - Multiplication
10. Construction and Study of Parallel binary adder
11. Construction and Study of Multiplexers and Demultiplexers
12. Microprocessor - Ascending and Descending orders
13. Construction and Study of Parallel binary Subtractor
14. Construction and Study of Shift registers
15. Microprocessor - Addition of an array of numbers and comparison of two numbers
16. Construction and Study of MOD 3 and MOD 5 up counters
17. Construction and Study of BCD to decimal decoder
18. Microprocessor - Division

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Albert Paul Malvino, Donald P. Leech	Digital Principle And Applications	Mc.Graw Hill\7th Edition	2011
2	Paul B.Zbar, Malvino, Miller	Electronics: A Text- Lab Manual	Mc.Graw Hill, New York	2001

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Leech	Experiments In Digital Principles	Mc.Graw Hill, New York\ 3rd Edition	1986
2	Paul B.Zbar, Malvino, Sloop	Electricity & Electronics Fundamentals: A Text- Lab Manual	Mc.Graw Hill	1997
3	Woollard G	Practical Electronics	Mc.Graw Hill\ 2nd Edition	1984
4	Subramaniyan S.V	Experiments In Electronics	Macmillan India Ltd, New Delhi	1983
5	Bhargowa N.N	Basic Electronics And Linear Circuits	Tata Hill Publishing Co Ltd, New Delhi.	1984

Designed by	Verified by HOD	Checked by CDC	Approved by COE
Name: Dr. M.Karthika Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	B.Sc. PHY			Programme Title:	Bachelor of Science	
Course Code:	26UPS6S5			Title	Batch:	2026 - 2029
				SEC IV : Computer lab in C	Semester:	VI
Lecture Hrs./Week	3	Tutorial Hrs./Sem.	-		Credits:	2

Course Objective

To develop the skill to gain knowledge in C language

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and become familiar with C programs	K1
CO2	Apply the statements to write the programs	K2
CO3	Demonstrate the use of functions and arguments in C language	K3
CO4	Explain the concepts of conditional and looping statements	K4
CO5	Write new programs for application in various field of Physics	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	L	M	M	L	H	L	M	H
CO2	L	L	H	L	H	M	M	H
CO3	L	L	H	L	M	M	M	H
CO4	M	M	H	L	H	M	M	H
CO5	M	M	H	M	H	H	H	H

H – High; M – Medium; L – Low

Computer lab in C

List of Programs:

1. Temperature Conversion
2. Largest /Smallest of three numbers
3. Quadratic equation
4. Fibonacci number
5. Armstrong number
6. Electric Power Consumption
7. Sum of n numbers
8. Ascending/Descending order
9. Matrix Addition/ Subtraction
10. Matrix multiplication
11. Sorting of names
12. Multiplication Table
13. Swapping of two numbers using function
14. Factorial of any number using recursion function
15. Pointer as function arguments

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Balagurusamy E.	Programming In Ansi C	Tata McGraw Hill Publishing Company, New Delhi	2004

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ravichandran D.	Programming In C	New Age International (P) Limited Publishers	1998
2	Yashvant Kanetkar	Let Us C	BPB Publications, New Delhi	1995

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Name: Dr. A. G. Kannan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UMS3A3/ 26UCY3A4	Title	Batch:	2026 - 2029
		Physics for Mathematics - I/ Physics for Chemistry - I	Semester:	III
Hrs/Week:	5		Credits:	4

Course Objective

To acquire the knowledge in concepts of applied physics

Course outcomes

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic principles in mechanics	K1/K2
CO2	To apply knowledge in estimating the mechanical parameters	K3
CO3	To analyze the knowledge in applications	K4
CO4	To evaluate the principles of physics in mathematics and chemistry	K5
CO5	To solve Physics related problems	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	H	M	H	H	H
CO2	M	H	M	M	H	H	-	M
CO3	H	H	M	H	L	L	H	-
CO4	M	L	H	H	M	H	M	M
CO5	H	M	-	M	H	M	H	L

H – High; M – Medium; L – Low

Physics for Mathematics and Chemistry - I

Unit	Content	Hrs
I	ELASTICITY Stress and Strain – Different moduli of Elasticity – Poisson's ratio – Relation between angle of shear and linear strain – Work done in a strain – Relation between the elastic moduli- Determination of Poisson's ratio for rubber – Torsion of a cylinder – Expression for torque per unit twist – Work done in twisting a wire – Torsion oscillations of a body – Rigidity modulus by torsion pendulum (Dynamic torsion) – Bending of beam – Expression for bending moment – Uniform bending of a beam- <i>Measurement of Young's Modulus</i>	15
II	GRAVITATION AND MOMENT OF INERTIA Newton's law of gravitation - Kepler's laws of planetary motion - Gravitational potential and field – Potential and field due to a spherical shell – Potential and field due to a solid sphere – Variation of g with altitude – Variation of g with depth – Compound Pendulum - Variation of g with compound pendulum – Moment of inertia – Perpendicular axes and Parallel axes theorem – Moment of inertia of a circular disc.	15
III	ACOUSTICS AND SOUND Types of sound - Reverberation- Sabine's formula – Factors affecting the acoustics of building - Ultrasonics – Piezoelectric effect - Production of Ultrasonic waves - magnetostiction method – Piezoelectric crystal method – Properties of ultrasonics – Determination of velocity of ultrasonic waves in liquid – Sonar – Industrial applications – <i>Medical applications.</i>	15
IV	LASERS Characteristics of lasers – Absorption and Emission – Einstein's coefficients – Population inversion – Pumping methods – Components of laser - Production of laser: CO ₂ laser – He-Ne laser – Nd: YAG laser – Semiconductor laser - Industrial and Medical applications.	15
V	FIBER OPTICS Optical fibre –Optical fibre system - Optical fibre cable -Total internal reflection – Propagation of light through an optical fibre – Critical angle – Acceptance angle – Numerical aperture – Classification of optical fibres – Types of fibres – Fibre optic communication system – fiber optic sensors – Temperature sensors – Displacement sensor.	15
Total contact hours		75

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Murugesan R	Properties of Matter	S. Chand & Company Ltd, New Delhi	2016
2	Subrahmanyam and Brijlal, Avadhanulu	A Test Book of Optics	S. Chand & Company Ltd, New Delhi	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Mathur D.S.	Elements of Properties of Matter	Shyam Lal Charitable Trust, New Delhi	2003
2	Pedrotti L. & Pedrotti S	Introduction to Optics	Prentice Hall International Edition, New Delhi	2008
3	Wayne Tomasi and Vincent F. Alisouskas	Telecommunications	Prentice Hall International Edition, New Delhi	1998

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Programme code:	BSc PHY	Programme Title :	Bachelor of Science	
Course Code:	26 UMS 4A4 / 26 UCY 4A5	Title	Batch :	2026 - 2027
		Physics for Mathematics - II/ Physics for Chemistry - II	Semester	IV
Hrs/Week:	5		Credits:	4

Course Objective

To develop the basic concepts of physics applied in chemistry and mathematics

Course outcomes

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic concepts of physics in electricity, semiconductors, optics and digital electronics	K1/K2
CO2	To apply analog and digital systems	K3
CO3	To analyze knowledge on number systems and logical expressions	K4
CO4	To evaluate the expressions into useful circuits	K5
CO5	To create logic gates circuits	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	H	M	H	M	H
CO2	M	-	M	M	H	H	-	M
CO3	H	H	M	M	L	L	H	-
CO4	M	L	H	H	M	H	M	M
CO5	H	M	-	M	H	-	H	L

H-High; M-Medium; L-Low

Physics for Mathematics & Chemistry- II

Unit	Content	Hrs
I	ELECTRICITY AND MAGNETISM Electric field, Intensity & Potential - Potential due to a charged conducting sphere - Capacitance - Parallel plate capacitor - Energy stored in a charged capacitor - Kirchoff's law - Wheatstone's bridge - Potentiometer - Measurement of Resistance & EMF - Calibration of Ammeter & Voltmeter - <i>Biot Savart law</i> - Field along the axis of a circular coil – Magnetic induction at a point due to straight conductor carrying current.	15
II	WAVE OPTICS Interference - Theory of interference - Young's double slit experiment – Condition for bright and dark fringes - Newton's rings - Condition for bright and dark rings – radius of dark fringes – spacing between fringes - Theory of plane transmission grating – Dispersive power of grating – prism and grating spectra – polarization – unpolarized and polarized light – types of polarization.	15
III	SEMICONDUCTOR PHYSICS Semiconductor - Intrinsic and Extrinsic semiconductors - Junction diode and Zener diode characteristics - Half & Full wave Rectifiers - Regulated power supply - Transistor and its action – Characteristics of common base, common emitter and common collector configurations - Relations between α and β	15
IV	NUMBER SYSTEMS Binary, octal, decimal, hexadecimal number systems, Binary Addition and Subtraction, Multiplication & Division – Conversion of number systems - one's complement and two's complement subtraction - BCD number system - Gray code - gray to binary and binary to gray conversion - Excess 3 code – <i>ASCII codes</i>	15
V	LOGIC GATES AND CIRCUITS OR, AND & NOT gates using Discrete components and ICs - NOR & NAND gates - Universal building blocks - Demorgan's theorems - XOR & XNOR gates - Laws and theorems of Boolean algebra - Simplification of Boolean expression - Half & full adders - Half & full subtractors	15
Total contact hours		75

- *Italic font denotes self study*

Pedagogy and Assessment Methods:

Seminar, Assignment, Experience discussion, PPT

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Murugesan R	Electricity and Magnetism	S. Chand & Company Ltd, New Delhi	2008
2	Brijlal and Subramaniam	A Test Book of Optics	S. Chand & Company Ltd, New Delhi	1999
3	Theraja B.L	Basic Electronics Solid state	S.Chand & Company Ltd, New Delhi	1998
4	Murugesan R & Kiruthiga sivaprasath	Modern Physics	S.Chand & Company Ltd, New Delhi	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Brijlal and Subramaniam	Electricity and Magnetism	S.Chand & Company Ltd, New Delhi	1987
2	Sadasiva Biswal	Basic Electronics.	Atlantic Publishers and Distributors	2001
3	Narayana Rao B.V	Principles of Electronics	Wiley Eastern Limited New Age International Limited	1994
4	Malvino and Leech	Digital Principles and Applications	Tata Mc Graw Hill Publishing Company, New Delhi	1986

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Name: Dr.V. Saravanan Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr. T.E. Manjulavalli Signature:	Name: Dr.P.Maheswari Signature:

Programme Code:	BSc PHY	Programme Title:	Bachelor of Science	
Course Code:	26UMS4A5/ 26UCY4A6	Title	Batch:	2026 - 2029
		Physics Lab for Mathematics/ Physics Lab for Chemistry	Semester:	III & IV
Hrs/Week:	3		Credits:	2

Course Objective

To enable the student to gain practical knowledge in Physics instruments

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	To remember depth knowledge in Elasticity of rigid materials	K1/K2
CO2	To analyze the concepts of physics on measurements and instrumentations of physical experiments	K3
CO3	To apply practical skills in analog and digital measurements	K4
CO4	To evaluate concepts of logic gates	K5
CO5	To create various logic gates using ICs	K6

Mapping

PO/PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PO6	PSO1	PSO2
CO1	H	M	H	M	M	H	M	H
CO2	M	-	M	M	H	H	-	M
CO3	H	H	M	-	M	-	H	-
CO4	M	L	H	H	H	H	M	H

H-High; M-Medium; L-Low

Physics Lab for Mathematics & Chemistry

List of Experiments:

1. Young's modulus – Uniform bending - Pin and Microscope
2. Young's modulus – non-Uniform bending - Pin and Microscope
3. Rigidity Modulus and Moment of Inertia – Torsional Pendulum
4. Acceleration due to Gravity and Moment of Inertia - Compound pendulum
5. Wavelength of Mercury source – Grating - Normal incidence – Spectrometer
6. Refractive index of a Prism - Spectrometer
7. Refractive index of a Lens - Newton's Rings
8. Calibration of Low range Voltmeter and Ammeter - Potentiometer
9. Specific resistance of a Wire - Potentiometer
10. Horizontal Component of Earth's Magnetic Field (H) - Field along the axis of a Circular coil carrying current
11. Characteristics of PN Junction Diode
12. Characteristics of Zener Diode
13. Basic Logic Gates using ICs
14. NAND as Universal building block
15. NOR as Universal building block
16. Demorgan's Theorem verification using logic gate ICs and problem solving using Boolean algebra
17. Half & Full Adder
18. Half & Full Subtractor

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Govindarajan S.R. Sundarajan S	Practical Physics	Roc house & sons Pvt Ltd.	1959

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBLICATION
1	Paul B.Zbar, Malvino, Miller	Electronics	A Text-Lab Manual. Mc.Graw Hill, New Delhi	1983

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