Course Name : **Bachelor of Science**
Discipline : **PHYSICS**
(For those who joined in June 2024 and after)

Course Objectives:

- Nowadays most of the students prefer to join Professional Colleges after completing their higher secondary School studies. Only limited students wish to join Science Colleges.
- The curriculum of B.Sc. Physics programme is now carefully designed to create interest in Physics and in order to prepare the students to meet the challenges of Society locally or globally.
- After the successful completion of this course, a B.Sc. degree holder would be able to face various competitive examinations and take up any job requiring the graduateship.

Also, the degree holder will become equipped to undergo various post graduate courses in Physics and related subjects and to give full assistance to researchers in various research and development laboratories.

Course Scheme:

I year B.Sc. PHYSICS

Semester	Part	Subject Name	Hours	Credit	Int + Ext =Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
I	Part 1	**Tamil**	6	3	25+75=100												**U24PT11**	**New**
	Part 2	English	6	3	25+75=100												U23PE11	No Change
	Core 1	**Mechanics and Sound**	5	4	25+75=100				✔					✔			**U24PHC11**	**New**
	Core Lab	**LAB: General Physics I**	3	-	-				✔					✔	✔	✔	-	-
	Allied	**Ancillary Mathematics-I Algebra and Trigonometry**	6	4	25+75=100												**U24MAAX11**	**New**
	SBS 1	**Solar Thermal and Photovoltaic systems**	2	2	25+75=100				✔						✔	✔	**U24PHS11**	**New**
	SBS 2	**Materials Science**	2	2	25+75=100				✔							✔	**U24PHS12**	**New**
	Total		**30**	**18**														

II	Part 1	**Tamil**	6	3	25+75=100												**U24PT21**	**New**
	Part 2	English	6	3	25+75=100												U23PE21	No Change
	Core 2	**Properties of Matter**	4	4	25+75=100				✔					✔			**U24PHC21**	**New**
	Core 3	**Heat and Thermodynamics**	5	4	25+75=100				✔					✔			**U24PHC22**	**Revised 10%**
	Core Lab	**LAB: General Physics I**	3	2	40+60=100				✔					✔	✔	✔	**U24PHCP21**	**New**
	Allied	**Ancillary Mathematics-II Calculus And Matrices**	6	4	25+75=100												**U24MAAX21**	**New**
	Total		**30**	**20**														

Year	Part	Subject	Credit	Int=Total	Code
I & II	Part V	NSS/ NCC/ Physical Education – Sports/YRC/RRC	3	100=100	U2NS4/ U2NC4/ U2PS4/ U1YR4/ U22RR4

TENTATIVE SYLLABUS STRUCTURE

II Year

Sem	Part	Subject	Hour	Credit	Marks			Subject Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/No Change/ Interchanged If Revised % of Change
					I	E	T			
III	Part 1	Tamil III	6	3						
	Part 2	English III	6	3						
	Core 4	Electrostatics and current electricity	4	4						
	Allied	Allied Maths Paper 3	6	4						
	Core Lab	General Physics II	2	-						
	Allied	Ancillary Chemistry I	4	4						
	Allied	Ancillary Chemistry Lab	2	-						
		Total	**30**	**18**						

Sem	Part	Subject	Hour	Credit	Marks			Subject Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/No Change/ Interchanged If Revised % of Change
					I	E	T			
IV	Part 1	Tamil IV	6	3						
	Part 2	English IV	6	3						
	Core 5	Electromagnetism	4	4						
	Allied	Allied Maths Paper 4	6	4						
	Core Lab	General Physics II	2	2						
	Allied	Ancillary Chemistry II	4	4						
	Allied	Ancillary Chemistry Lab	2	2						
		Total	**30**	**22**						

Year	Part	Subject	Credit	Marks			Subject Code
				I		T	
I & II	Part V	NSS/NCC/YRC/RRC/Sports	3	100		100	

III Year

Sem	Subject	Hrs	Credit	Int. + Ext. = Total	Subject Code
V	Core 6 - Analog Electronics	4	4		
	Core 7 - Physical Optics & Spectroscopy	4	4		
	SBS 3 - Electrical Wiring	2	2		
	SBS 4 - Physics of Human Anatomy	2	2		
	NME 1 - Basic Physics	2	2		
	Core (Major) Lab 3 – General Physics	3	-		
	Core (Major) Lab 4 – Electronics	3	-		
	Core (Major) - Project & Area Study	2	-		
	Ancillary Chemistry III	4	4		
	Ancillary Chemistry Lab	2	2		
	Employability Skills	2	2		
	Total	**30**	**22**		

VI	Core 8 - Atomic & Nuclear Physics	4	4		
	Core 9 - Digital Electronics	4	4		
	Core 10 - Classical & Statistical Mechanics	4	4		
	SBS 6 - Biomedical Instrumentation	2	2		
	NME 2 - Solar Energy	2	2		
	Core (Major) Lab 3 – General Physics	3	3		
	Core (Major) Lab 4 – Electronics	3	3		
	Core (Major) - Project & Area Study	2	5		
	Ancillary Chemistry IV	4	4		
	Ancillary Chemistry Lab	2	2		
	Total	**30**	**33**		

SEMESTER – I

Course Title :MECHANICS AND SOUND	**Total Hours : 5**
Course Code : U24PHC11	**Total Credits : 4**

Course Outcomes:

COs	CO Statement
CO1	Learn different types of impact and projectile motion
CO2	Understand the concepts of Centre of Gravity of different shapes of solids and centre of Pressure of laminas immersed in liquid
CO3	Get knowledge about angular momentum, torque and Rocket Motion
CO4	Learn the Characteristics of wave motion and Interference of Sound waves
CO5	Verification of laws of transverse vibration of strings and understanding acoustics of buildings

UNIT: I **15 Hours**

Impact of elastic bodies: Impulse of a force - what is collision? - Fundamental principles of impact - Oblique impact of a smooth sphere on a fixed smooth plane - Direct impact of two smooth spheres - Loss of kinetic energy due to direct impact of two smooth spheres - Oblique impact of two smooth spheres - Loss of kinetic energy due to oblique impact.

Projectile Motion: Range on an inclined plane - Range and time of flight down an inclined plane - Two body problem and the Reduced Mass.

UNIT: II **15 Hours**

Center of Gravity: Introduction - Center of gravity of a right solid cone - Center of gravity of a solid hemisphere - Center of gravity of a solid tetrahedron - Center of gravity of a compound body - Equilibrium of Bodies suspended and supported - Stability of equilibrium - Curved surface on another surface.

Hydrostatics: Center of pressure - Center of pressure of a rectangular lamina immersed vertically in a liquid with one edge in the surface of the liquid - Floating Bodies - Experimental determination of the metacentric height of a slip - Atmospheric pressure.

UNIT: III **15 Hours**

Centre of Mass: Centre of mass - Motion of centre of mass of a system of particles - Conservation of linear momentum - Angular momentum - Relation between torque and Angular momentum - Angular momentum of a system of particles - Conservation of Angular momentum

Rocket motion: Principle - Theory - Velocity of rocket at any instant - Rocket propulsion system - Specific impulse - Multistage rocket - Shape of the rocket.

UNIT: IV **15 hours**

Sound - Wave motion - Characteristics of wave motion - Transverse wave motion - Longitudinal wave motion - Definitions - Relation between frequency and wavelength

Interference and Beats: Properties of longitudinal progressive waves - Interference of Sound waves - Special cases - Conditions for Interference of Sound waves - Energy distribution Due to Interference of Sound waves - Beats - Analytical treatment of beats

UNIT:V **15 Hours**

Vibrations in Strings: Velocity of Transverse waves along a stretched string - Laws of transverse vibration of strings - verification of the laws of transverse vibration of strings - Melde's experiment.

Doppler effect: Observer at rest and source in motion - source at rest and observer in motion - when both the source and observer are in motion –

Acoustics of Buildings - Reverberation - Factors affecting the acoustics of buildings - Sound distribution in auditorium - Requisites for good acoustics.

Text Books:

(1) Mechanics and Mathematical Physics - R. Murugesan, S. Chand & Company Pvt. Ltd. 2014.

UNIT- I: 1.1 - 1.7, 2.1- 2.4,
UNIT- II: 3.1, 3.2, 3.4, 3.6, 3.7, 3.10, 3.11, 4.3, 4.4, 4.7, 4.8
UNIT- III: 13.1- 13.14

(2) A Text Book of Sound - N. Subrahmanyam and Brij Lal, VIKAS Publishing House Pvt Ltd. 2nd Edition, 2004

UNIT- IV: 4.1-4.8, 6.6-6.9, 6.13, 6.14
UNIT- V: 7.1, 7.3-7.5, 8.1-8.4, 10.14, 10.15, 10.20-10.22

Reference Books:

(1) Fundamental of Physics - D. Halliday, Resnick and J. Walker, Wiley, 6th Edition, New York. 2001.

(2) Sears and Zemansky's University Physics by H. D. Young, R. A. Freedman, A. L. Ford, Publisher: Pearson, 10th Edition, 2015.

(3) Mechanics by R.K. Shukla. and A. Srivastava New Age International, 2006

Allied 1 [Ancillary - Mathematics]

Course Title: ALGEBRA AND TRIGONOMETRY	**Total Hours: 90** **Contact Hours per Week : 6**
Course Code: U24MAAX11	**Total Credits: 4**

Objectives:

- To enable the students to sum the series
- To develop the skills of solving equations

Course Outcomes:

On completing this course, students can/are

Cos	CO Statement
CO1:	Gain knowledge on various series like binomial series, logarithmic series, trigonometric series.
CO2:	Develop the ability to solve equations and understand the nature of roots of higher order equations.
CO3:	Acquire knowledge on hyperbolic functions.

Unit I Binomial Theorem **[18 Hours]**

Binomial theorem for rational index – Some important particular cases of the Binomial expansion – Sign of terms in the Binomial expansion – Numerically greatest term – Application of the binomial theorem to the summation of series.

(Text Book 1: Chapter 3: Sections 5, 6, 7, 8, 10 **)**

Unit II Exponential and Logarithmic Series **[18 Hours]**

The exponential theorem – Summation – Problems of the form $\sum_{n=0}^{\infty} f(n) \cdot \frac{x^n}{n!} = (a_0 + a_1 x + a_2 x^2 + \cdots + a_r x^r) e^x$ where $f(n)$ is a polynomial – Logarithmic series – Using the different forms of the logarithmic series finding the sums of the certain series – Series which can be summed up by the logarithmic series.

(Text Book 1: Chapter 4: Sections 2, 3, 3.1, 5, 7, 9 **)**

Unit III Theory of Equations **[18 Hours]**

Formation of Equations - Relation between roots and coefficients **(Text Book 2 - Chapter 2: Sections:** 2.1 and 2.2 (pages 57 – 61 and 64-78)**)**

Unit IV Theory of Equations **[18 Hours]**

Transformation of equations - Newton's method – Horner's method **(Text Book 2 - Chapter 2: Sections:** 2.4 and 2.5 (pages 92 – 108)**)**

Unit V Trigonometry **[18 Hours]**

Expression for $\sin n\theta, \cos n\theta \ and \ \tan n\theta$ – Expression for – $\sin^n \theta$ and $\cos^n \theta$ - Hyperbolic functions – Inverse Hyperbolic functions.

(Text Book 2 - Chapter 4: Sections 4.1, 4.2 (pages 195 -204), Sections 4.4, 4.5 (pages 214 - 228)**)**

Text Book (s):

1. T.K.Manicavachagom pillai, T.Natarajan and K.S.Ganapathy, Algebra, Volume I, S.Viswanathan (Printers & Publishers), Pvt., Ltd, 2008.
2. Arumugam, Isaac, Ancillary Mathematics, Paper 1 Revised, New Gamma Publishing House, 2002.

Reference Book (s):

1. Arumugam, Isaac, Classical Algebra, New Gamma Publishing House.
2. Arumugam, Isaac, Summation of Series and Trigonometry, New Gamma Publishing House.

Course Title: SOLAR THERMAL AND PHOTOVOLTAIC SYSTEMS	**Total Hours : 2**
Course Code : U24PHS11	**Total Credits : 2**

Course Outcomes:

COs	CO Statement
CO1	Understand the fundamentals and need for conventional Energy Sources and non-conventional Energy Sources.

CO2	Study about Sun and Solar radiation
CO3	Learn about Solar collector, Solar water heater and Solar Cookers
CO4	Learn about Solar Furnaces, Solar Dryer and Solar Distillation
CO5	Study the Solar PV systems and their applications

Unit I: Fundamental of Energy – science and technology **6 Hours**

Energy Consumption & Standard of living - Classification energy sources – Consumption trends of primary energy Sources – Importance of Non-Conventional Energy Sources - Advantage and disadvantage of conventional Energy Sources - Salient Features of Non-Conventional Energy Sources.

Unit II: Solar Energy – Basics **6 Hours**

The Sun as a Source of energy – The Earth – Sun, Earth radiation Spectrum – Measurements of Solar radiation (Pyranometer, Pyrheliometer, Sunshine recorder).

Unit III: Solar Thermal System **6 Hours**

Solar Thermal System – Solar collector – Classification - Comparison of concentrating and non-concentrating types (Flat-plate collector) of solar collector-Performance Indices-Liquid flat plate collector – Solar water heater – Solar Cookers-Box type solar cooker-Paraboloidal dish type solar cooker.

Unit IV: Solar Thermal System **6 Hours**

Solar Furnaces - Solar Greenhouse – Regulation of internal environment of greenhouse-Typical winter greenhouse-Typical summer greenhouse-Solar Dryer – Solar Distillation.

Unit V: Solar Photovoltaic System **6 Hours**

Solar Photovoltaic systems – Solar cell fundamentals - Semiconductor – A pn junction– Solar cell, Module, Panel and Array construction – Solar cell – Solar PV systems - Classification – Solar PV Applications- Water pumping- Lighting – Village Power.

Text Book

B. H. Khan. Non-conventional energy sources. New Delhi: Tata Mcgraw Hill (P) Ltd. 2006.
Unit I: Chapter 1 – 1.1, 1.3, 1.4, 1.5, 1.8, 1.9
Unit II: Chapter 4 – 4.1, 4.2, 4.3, 4.7
Unit III: Chapter 5 – 5.1(5.1.1,5.1.2,5.1.3,5.1.4), 5.2, 5.6 (5.6.1,5.6.2)
Unit IV: Chapter 5 – 5.7, 5.8 (5.8.1,5.8.2,5.8.3),5.9, 5.10
Unit V: Chapter 6 – 6.1(6.1.1,6.1.2), 6.4(6.4.1), 6.8, 6.9(6.9.2,6.9.3,6.9.5)

Reference Book:

1. Solar energy Fundamentals, Design, Modelling and Applications by G.N. Tiwari, Narosa Publishing House, 2016
2. Solar Energy Utilization by G D Rai, Khanna Publishers, New Delhi, 2012

Course Title :MATERIALS SCIENCE	**Total Hours : 2**
Course Code : U24PHS12	**Total Credits : 2**

Course Outcomes:

COs	CO Statement
CO1	Study bonding in solids and crystal structure
CO2	Understand the electronic theory of solids
CO3	Understand the behaviour of Dielectric materials
CO4	Study Magnetic properties of solids
CO5	Study Nanophase materials and nonlinear materials

UNIT - I: **6 Hours**

Crystal Geometry – Introduction-Fundamental terms of Crystallography - Types of Crystals - Crystal structures of materials- Simple cubic, Body centred and Face centred cubic crystal structures.

UNIT - II: **6 Hours**

Electron Theory of Solids - Introduction - electrical conduction - classification of conducting materials - Drude Lorentz theory - Expressions for electrical conductivity and thermal conductivity – Wiedemann - Franz Law.

UNIT - III: **6 hours**

Dielectric Materials - Introduction - definitions - different types of Polarization - Clausius - Mosotti equation - Dielectric properties - Applications.

UNIT - IV: **6 hours**

Magnetic Materials - Introduction - magnetic parameters - classification of magnetic materials - Ferro magnetic materials - Hard and Soft magnetic materials.

UNIT - V: **6 Hours**

New Materials - Nonlinear materials: Introduction-Principle, classification, properties: Polarisation-Frequency doubling. Nanophase Materials: Introduction - Synthesis - Properties of Nanophase materials

Text Book:

Materials Science - V.Rajendran, McGraw-Hill Education(India) private limited, Chennai, Sixth reprint, 2017

Unit - I : 2.1- 2.3, 2.5-2.8
Unit - II :7.1- 7.8
Unit - III : 18.1 -18.3,18.7,18.12,18.16
Unit - IV : 19.1-19.2,19.4,19.8,19.11
Unit - V : 25.1 -25.4.2,28.1-28.2,28.10

Reference Book:

1. Fundamentals of Solid State Physics - Saxena, Gupta and Saxena, Pragati Prakashan Publications Ltd., 2015, Reprint, 15th edition.
2. Introduction to Solids – Azaroff, Tata Mc Graw Hill Publications, 1993, Reprint
3. Solid State Physics - R.K Puri and V.K. Babbu, S.Chand Limited, 2008.

SEMESTER – II

Course Title :PROPERTIES OF MATTER	**Total Hours : 4**
Course Code : U24PHC21	**Total Credits : 4**

Course Outcomes:

COs	CO Statement
CO1	Understand the principles of Elasticity
CO2	Study about bending of beams
CO3	Understand the concept of fluid dynamics and Osmosis.
CO4	Understand the concepts of viscosity and its applications.
CO5	Learn the importance of surface tension of liquids

UNIT - I: **12 Hours**

Elasticity:

Introduction - Different moduli of elasticity - Relation between volume strain and linear strain - work done in strain-Behaviors of wire under progressive tension - Relation between the elastic moduli - Determination of Poisson's ratio for rubber - Torsion of a body - Work done in twisting a wire -Torsional oscillation of a body - Rigidity modulus by torsion pendulum (Dynamic torsion method).

UNIT - II: **12 Hours**

Bending of beams:

Definition - Expression for bending moment - Depression of the loaded end of a cantilever - Measurement of E (Cantilever depression) - Oscillation of a cantilever - Depression at the mid - point of a beam loaded at the middle - Uniform bending of a beam - Measurement of Young's modulus - by bending of a beam.

UNIT - III: **12 hours**

Fluid Dynamics and Osmosis

Rate of flow of fluid-Lines and tubes of flow-Equation of continuity of flow-Energy of a liquid in flow-Bernoulli's theorem-Important applications of Bernoulli's theorem (Venturimeter and Pitot tube only)- Osmosis and Osmotic pressure-Laws of osmotic solution-Osmosis and vapour pressure of a solution.

UNIT - IV: **12 hours**

Viscosity:

Viscosity-Fugitive Elasticity-Critical velocity-Significance of Reynold's number-Poiseuille's formula for the flow of a liquid through a horizontal capillary tube – Criticism of Poiseuille's equation - Corrections to it – Motion in a viscous medium – Stoke's law-Determination of coefficient of viscosity of a liquid- Stoke's falling body.

UNIT - V: **12 hours**

Surface Tension:

Molecular forces-Molecular range-Sphere of influence-Explanation of surface tension-Surface film and surface energy-Free energy of surface and surface tension-Units and dimensions of surface tension-Pressure difference across a liquid surface-Determination of

surface tension of a bubble-Work done in blowing a bubble-Curvature, pressure and surface tension(case of a spherical surface only)

Text Books:

1. Properties of Matter - R.Murugeshan and Er. Kiruthiga, S. Chand & Co. Pvt Ltd. 2014.

Unit - I: 1.1, 1.2, 1.4–1.9, 1.12, 1.13
Unit - II: 1.14 –1.21

2. Elements of Properties of Matter – D.S.Mathur , S. Chand & Co. Pvt Ltd. (Reprint 2018).

Unit III: 12.1 -12.6, 13.7 – 13.10
Unit - IV: 12.7 – 12.12,12.15,12.16
Unit - V: 14.1 – 14.10

Reference Books:

1. Mechanics and Properties of Matter - C.L. Arora, S. Chand & Co. 1999
2. Concept of physics by H.C.Verma, Bharati Bhawan publishers and distributors (2015).

Course Title :HEAT AND THERMODYNAMICS	**Total Hours : 5**
Course Code : U24PHC22	**Total Credits : 4**

Course Outcomes:

COs	CO Statement
CO1	Derive ideal gas equation, transport phenomena of gases
CO2	Study the fundamentals of thermodynamics, Carnot engine and to understand reversible, irreversible process, entropy and change in entropy
CO3	Understand conduction & convection and to study the fundamental laws of black body radiation
CO4	Understand the concept of specific heat capacity and experimental determination of C_v& C_p
CO5	Study Joule-Thomson effect, liquefaction of gases and to understand the working of Refrigerator & Air-conditioner

UNIT - I: Kinetic Theory of Gases **15 hours**

Concept of Ideal or Perfect gas – Kinetic model – Brownian motion - Degrees of freedom - Maxwell's law of Equipartition of energy – Critical constants - Van der Waals' equation of state – Estimation of critical constants – Molecular collisions - Mean free path - Expression for the mean free path - Transport phenomena – ***Viscosity***: Transport of momentum – ***Thermal conductivity***: Transport of thermal energy – ***Self Diffusion***: Transport of mass

UNIT - II: Thermodynamics **15 Hours**

Zeroth law of thermodynamics –First law of thermodynamics – Work done during isothermal & adiabatic process - Reversible & Irreversible process - Heat engine – Definition of efficiency – Carnot's ideal heat engine – Carnot's cycle – Second law of thermodynamics – Carnot's theorem – Change in entropy - Change of entropy in a reversible and irreversible cycle –Temperature – entropy diagram - Third law of thermodynamics.

UNIT - III: Transmission of Heat **15 hours**

Thermal Conduction: Introduction – Coefficient of thermal conductivity – Steady state – Lee's disc method of determining the thermal conductivity of a bad conductor

Convection: Introduction – Convection in the atmosphere – Lapse Rate – Stability of the atmosphere – Greenhouse effect

Thermal Radiation: Introduction – Fery's black body – Wien's black body – Energy distribution in black body radiation – Planck's hypothesis – Planck's law of radiation – Wien's law – Rayleigh-Jean's law – Stefan's law – Derivation of Newton's law of cooling from Stefan's law – Determination of Stefan's constant – Solar constant – Determination of solar constant – Water flow pyroheliometer.

UNIT - IV: Thermometry and Calorimetry **15 Hours**

Platinum resistance thermometer – Thermistor - Specific heat capacity - Dulong and Petit's law - Calorimetry basic concepts – Principle of calorimetry or method of mixtures – The two specific heat capacities of a gas – Difference between the two specific heat capacities – Joly's differential steam calorimeter for finding C_v – Regnault's method to find C_p - Thermoelectric thermometer - Newton's law of cooling – Einstein's theory of specific heat capacity – Debye's theory of specific heat capacity of a solid

UNIT - V: Low Temperature Physics **15 Hours**

Joule-Thomson effect – Porous Plug experiment – Theory of Porous Plug experiment – Expression for the Joule-Thomson cooling produced in a Van der Waals gas - ***Liquefaction of gases :*** Introduction – Regenerative cooling – Liquefaction of Air (*Linde's process & Claude's process*) - Liquefaction of hydrogen - Liquefaction of helium - Practical applications of low temperatures – Refrigeration – Electrolux refrigerator – Frigidaire – Air-conditioning - Air-conditioner – Effects of CF_2Cl_2 on ozone layer.

Text Book:

1. **Heat, Thermodynamics and Statistical Physics** - Brijlal, N.Subrahmanyam and P.S. Hemne, S. Chand & Co. Pvt. Ltd., New Delhi, 2018 (Reprint)
   Unit - I : 1.2, 1.3, 1.13, 1.18-1.9, 2.4, 2.8, 2.10, 2.13, 3.1, 3.2, 3.5-3.8, 3.11, 3.16
   (Page No.5-7,14-15,21-23, 51, 54-58, 83-89, 91-92)
   Unit - II : 4.2, 4.7, 4.12-4.13, 4.20-4.24, 4.28, 4.29, 5.2, 5.4, 5.6, 5.7, 5.15)
   (Page No.109-110, 112-113, 121-123, 132-137, 139-141, 174-180, 189-190)

2. **Thermal Physics** - R.Murugeshan and Er.Kiruthiga Sivaprasath, S.Chand & Co. Pvt. Ltd., New Delhi, 2014 (Reprint)
   Unit - III : 4.1 – 4.4, 11.1 - 11.5, 4.5 - 4.12, 4.16, 4.17, 4.20, 4.25, 4.26
   (Page No.74-85, 93-94, 98-100, 105-107, 185-188)
   Unit - IV : 1.1 - 1.4, 1.6, 1.7, 1.10 – 1.13, 6.1 – 6.4
   (Page No.1-9, 12-16,135-140)
   Unit - V : 3.1 – 3.10, 3.13 – 3.18, 3.21
   (Page No.53-61, 64-72)

Reference Books:

1. **Heat and Thermodynamics** - D.S. Mathur, S. Chand & Co. Pvt. Ltd., New Delhi, 2008
2. **Heat and Thermodynamics** - Mark W Zemansky, Richard H Dittman, Mc Graw Hill Education; 8th edition, 2017)

Course Title :LAB : GENERAL PHYSICS - I	**Total Hours : 3**
Course Code : U24PHCP21	**Total Credits : 2**

Course Outcomes:

COs	CO Statement
CO1	Student can get basic practical knowledge about General Physics
CO2	Understand the practical and theory knowledge of thermal physics
CO3	Do the experiments on Sound
CO4	Do experiments based on Viscosity
CO5	Do experiments based on Surface Tension

1. Estimation of instrumental errors (Screw gauge, Vernier Caliper and TravellingMicroscope) - **Orientation Session**
2. Determination of Young's Modulus by Uniform bending (Pin & Microscope) method.
3. Determination of Young's Modulus by Non-Uniform bending (Optic lever) method.
4. Determination of Young's Modulus by Cantilever depression method.
5. Determination of 'g' using Compound pendulum.
6. Determination of Rigidity Modulus and Moment of inertia using Torsion pendulumwith loads.
7. Verification of laws of vibration using Sonometer.
8. Determination of Frequency of AC mains using Sonometer.
9. Determination of Frequency of Tuning fork using Melde's String.
10. Determination of Thermal conductivity of bad conductor using Lee's disc method.
11. Determination of specific heat by cooling method.
12. Determination of Coefficient of viscosity of a liquid using Stoke's method.
13. Determination of Coefficient of viscosity of water by Poiseuille's flow method
14. Determination of viscosity of liquid using Ostwald Viscometer.
15. Determination of Surface Tension by Capillary rise method.
16. Calibration of Spectrometer and determination of angle of the prism.

Allied 2 [Ancillary - Mathematics]

Course Title: CALCULUS AND MATRICES	**Total Hours: 90** **Contact Hours per Week : 6**
Course Code: U24MAAX21	**Total Credits: 4**

Objectives:

- To know the applications of differential and integral calculus
- To develop the skills of solving simultaneous equations

Course Outcomes:

On completing this course, students can/are

Cos	CO Statement
CO1:	Apply the reduction formula to solve problems in integral calculus.
CO2:	Utilize the concept of vector differentiation to find the curl, divergence of a given vector.
CO3:	Construct the evolutes of any curve using differential calculus.
CO4:	Develop the skills of solving simultaneous equations by making use of the rank of

	matrices.
CO5:	Find the eigen values, eigen vectors of a given matrix.

Unit I Curvature [18 Hours]

Radius of curvature – center of curvature – Evolutes for ellipse, parabola and hyperbola only (p-r equations excluded).

(Text Book 1: Chapter 3: Sections: 3.2 (Pages 125 -134)**)**

Unit II Evaluation of definite integrals [18 Hours]

Reduction formulae 1 to 8.

(Text Book 1: Chapter 3: Sections: 3.3 and 3.5 (pages 147-156 and 166-170).

Unit III Vector Calculus [18 Hours]

Vector differentiation – Gradient – Velocity – Acceleration – Divergence – Curl.

(Text Book 3: Chapter 1: Sections: 1.4, 1.5 (pages 6 – 32)**)**

Unit IV Matrices [18 Hours]

Inverse of a matrix – Rank of a matrix – simultaneous equations.

(Text Book 2: Chapter 7: Problems only. Pages 179-209**)**

Unit V Matrices [18 Hours]

Cayley Hamilton Theorem (Statement only) **–** Eigen values – Eigen vectors**.**

(Text Book 2: Chapter 7: pages 210-232**)**

Text Book :

1. Arumugam, Isaac, Ancillary Mathematics, Paper 1 Revised, New Gamma Publishing House, 2002.
2. Arumugam, Isaac, Ancillary Mathematics, Paper III, New Gamma Publishing House, 2006.
3. Arumugam, Isaac, Ancillary Mathematics, Paper II (Revised), New Gamma Publishing House, 2004

Reference Book:

1. T.K.Manickavasagam Pillay and others,Vector Calculus, S.Viswanathan Printers pvt.Ltd.
2. Arumugam, Isaac, Calculus Revised, New Gamma Publishing House.
3. Arumugam, Isaac, Modern Algebra, New Gamma Publishing House

---