

I B.Sc (PH)	THERMAL PHYSICS	19PH203
SEMESTER – II		HRS/WK – 4
CORE – III		CREDIT –3

OBJECTIVE:

To understand the basics of heat transmission, kinetic theory of gases and working of low temperature devices.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Acquire knowledge of methods of heat transmission, different types of Heat engines and Entropy

CO2: Understand the nature and the kinetic theory of gases

CO3: Understand the different methods of liquefaction of gases.

CO4: Study the concepts of low temperature physics, refrigeration and air conditioning.

CO5: Understand the concepts of latent heat and its effect on boiling point and melting point and the significance of Maxwell’s thermodynamical relations

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - II	COURSE CODE: 19PH203					COURSE TITLE: THERMAL PHYSICS						Hours: 4	Credit: 3
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	3.5	4	3.5	4	3.5	4	4	3.5	3.5	3.5	3.73	
CO2	3.5	4	4	3.5	4	3.5	4	3.5	4	3.5	2.5	3.64	
CO3	4	4	3.5	4	3.5	4	3	3.5	3.5	3.5	4	3.68	
CO4	3	4	3.5	4	3.5	4	4	3.5	3.5	3.5	4	3.68	
CO5	4	4	3.5	3.5	4	4	3.5	4	3.5	3	3.5	3.68	
Mean Overall Score											3.68		

Result: The Score for this course is 3.68(High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs= $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs= $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific

Outcome

UNIT- I

(12 Hours)

Heat and Thermodynamics: Heat: C_p , C_v and γ of a gas- Mayer's relation- Basics of Heat transfer: Conduction, Convection, Radiation- Mechanical equivalent of Heat.

Thermodynamics: Reversible and irreversible processes – Heat engines – Otto and diesel engines – thermodynamic scale of temperature - entropy - change of entropy in reversible and irreversible processes – T-S diagram– entropy for a perfect gas - third law of thermodynamics

UNIT- II

(12 Hours)

Kinetic Theory Of Gases: Expression for pressure - Transport phenomenon – expression for mean free path - thermal conductivity and diffusion of gases - distribution of molecular velocities – energy distribution function - Degrees of freedom - equipartition law of energy.

UNIT- III

(12 Hours)

Adiabatic and Isothermal Changes and Liquefaction Of Gases: Reversible adiabatic and isothermal changes– equations – Clement and Desormes method of determining C_p / C_v – Andrew's work on CO_2 – regenerative cooling – the Linde process – Liquefaction of air and hydrogen-KamerlinghOnnes Cascade method for Liquefying Oxygen.

UNIT- IV

(12 Hours)

Low Temperature Physics: Helium – He I and He II – super fluidity - practical applications of low temperatures – refrigerating machines– electroflux refrigerator – Frigidaire – air conditioning machines – effects of CF_2 and Cl_2 on Ozone layer

UNIT- V

(12 Hours)

Phase Transition: First Latent heat equation (Clausius – Clapeyron equation), effect of pressure on melting and boiling point – second Latent heat equation - Maxwell's Thermodynamical relations–derivations.

TEXT BOOKS:

1. Mathur D.S., Heat and Thermodynamics, S. Chand, 2014.
2. NarayanamoorthyNandNagarathinam N, Heat, National publishing Co, Chennai, Eight Edition, 1987.
3. Murugesan.R., Thermal Physics., S. Chand & Co., 2009.
4. Brijlal and Subramanyam, Heat and Thermodynamics, S. Chand & Co., 2000.

REFERENCE BOOKS:

1. Nelkon Parker, Advanced Level Physics, (Vol.V), Arnold Publication, Berkely Series, 1995.
2. Dr. Ilangovan and Dr.D. Jayaraman,, Thermal Physics, S. Chand & Co., 2014.

I B.Sc (PH)	WAVES AND OSCILLATIONS	19PH204
SEMESTER – II		HRS/WK - 4
CORE – 1V		CREDIT - 3

OBJECTIVE:

Know about the basics of Simple Harmonic Motion, Doppler effect and production and detection of Ultrasonics.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Acquire knowledge of Simple Harmonic Motion

CO2: Understand the character of Transverse waves

CO3: Understand the character of longitudinal waves and Doppler effect

CO4: Acquire the knowledge of production, detection and applications of Ultrasonics

CO5: Acquire knowledge of Acoustics.

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - II	COURSE CODE: 19PH204					COURSE TITLE: WAVES AND OSCILLATIONS						Hours: 4	Credits: 3
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	3.5	4	3.5	4	4	3.5	3.5	4	3.5	3.77	
CO2	3.5	3.5	3.5	4	4	3.5	4	3.5	4	4	4	3.77	
CO3	4	4	4	3.5	4	3.5	3.5	3.5	3.5	4	4	3.77	
CO4	4	3.5	3.5	3.5	3.5	3	2.5	4	4	3.5	4	3.55	
CO5	3.5	4	3.5	4	3.5	3.5	4	4	3.5	3.5	3.5	3.68	
Mean Overall Score											3.71		

Result: The Score for this course is 3.71(High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT – I

(12 Hours)

Simple Harmonic Motion: Simple harmonic motion– Velocity and acceleration in SHM –

Energy of a simple harmonic oscillator (LC) –Examples of simple harmonic oscillators in electrical systems – Superposition of two SHMs of Equal time periods and acting at right angles to each other - Lissajous figures –Damped harmonic oscillations.

UNIT – II **(12 Hours)**

Transverse Waves: Introduction to transverse waves – Velocity of transverse waves in stretched string – Standing waves on a string-Determination of AC frequency using Sonometer (Steel wire) – Energy of a vibrating string – Standing wave ratio.

UNIT - III **(12 Hours)**

Longitudinal Waves: Introduction to longitudinal waves – Sound waves in gases – Energy distribution in sound waves – Intensity of sound waves – Longitudinal waves in a solid – Example: earthquake – Doppler Effect.

UNIT – IV **(12 Hours)**

Ultrasonics: Ultrasonics – Production of Ultrasonics: Piezo electric effect- Piezo electric crystal generator –Magnetostriction generator –Detection of ultrasonics –Thermal detectors – Piezo electric detectors - Applications of Ultrasonics- Ultrasound scan – NDT.

UNIT – V **(12 Hours)**

Acoustics: Reflection and transmission of sound waves at boundaries – Diffraction of sound waves- Noise and music – Limits of human audibility – The decibel unit- Reverberation time- Sabine’s formula for growth and decay – Acoustics of auditoriums and halls– Introduction to acoustic transducers.

TEXT BOOKS:

1. H. J. Pain, the Physics of Vibrations and Waves, John Wiley, (2005), 6th Edition, for Units I, II & III.
2. N. Subrahmanyam, Brijlal, A Text Book of Sound, Second Edition, Vikas Publishing house PVT Ltd, 2016.

REFERENCE BOOKS:

1. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, John Wiley & Sons(2004), 7th Edition.
2. Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppers and James V. Sanders, Fundamentals of Acoustics, John Wiley, (2000).
3. Richard P. Feynman, Robert B. Leighton, Matthew Sands, Feynman Lectures on Physics: The Definitive and Extended Edition. Addison-Wesley, (2005), 2nd Edition.

II B.Sc (PH)	ELECTRICITY AND MAGNETISM	19PH305
SEMESTER - III		HRS/WK - 5
CORE - V		CREDIT - 3

OBJECTIVE:

Understand the concepts of Electrostatic laws, growth and decay of charge in DC circuit.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Understand the concepts of Electrostatics and the laws associated with them.

CO2: Acquire knowledge of current electricity and thermoelectricity

CO3: Understand the growth and decay of charge and current in DC circuits.

CO4: Understand the basics of AC and Electromagnetic induction

CO5: Understand the concepts of magnetic properties of materials

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - III	COURSE CODE: 19PH305					COURSE TITLE: ELECTRICITY AND MAGNETISM						Hours: 5	Credits: 3
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4.5	4.8	4	4.5	4	4	4.2	3.5	4	4.5	4	4.18	
CO2	3	3.5	4	4.5	4	4	4	4	3.5	4	2.5	3.73	
CO3	4	4	4.5	3.5	4	3.5	3	3	3.5	4	3.5	3.68	
CO4	3.5	3	3	3.5	4	4.5	4	4	3.5	3	3.5	3.59	
CO5	4	3	3	3.5	3	3	3.5	3.2	3	3	3	3.15	
Mean Overall Score												3.68	

Result: The Score for this course is 3.68(High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT- I

(12 Hours)

Electrostatics: Coulomb's law – electric intensity and electric potential – electrical images (any four examples) - electric intensity and potential due to an earthed conducting sphere

applying the principle of electrical images-capacity – capacitance of a spherical and cylindrical capacitor – energy of a charged capacitor – loss of energy due to sharing of charges

UNIT- II **(12 Hours)**

Current Electricity: Carey foster bridge - theory – Determination temperature co-efficient of resistance – Calibration of voltmeter – Ammeter - Using Potentiometer - thermoelectricity- Peltier’s coefficient – Thomson coefficient – application of thermodynamics to a thermocouple and connected relations- thermoelectric diagram and uses.

UNIT- III **(12 Hours)**

Transient Current: Growth and decay of current in a circuit containing resistance and inductance – Growth and decay of charge in a circuit containing resistance and capacitor- Growth and decay of charge in a LCR circuit – condition for the discharge to be oscillatory – frequency of oscillation.

UNIT- IV **(12 Hours)**

A.C and Electromagnetic Induction: Power in AC circuit – wattless current- choke coil - construction and working of transformers- energy losses -single phase, and three phase AC – star and delta connection –electric fuses- circuit breakers.Self-Inductance-Mutual Inductance- Inductances in series and parallel-Principle, construction of AC electric motor.

UNIT-V **(12 Hours)**

Magnetic Properties of Materials: Susceptibility- permeability- intensity of magnetization and the relation $B= \mu(H+M)$, Principle, working & construction of Ballistic galvanometer -M-H and B-H curves for a magnetic material using magnetometer method and ballistic galvanometer method – Terrestrial magnetism – magnetic elements- dip circle.

TEXT BOOKS:

1. Murugesan R, Electricity and Magnetism, 8th Edition, New Delhi, S. Chand & Co., 2006.
2. Brijlal and N. Subramanian, Electricity and Magnetism, 6th Edition, Agra, Ratan&PrakashNarayanamoorthy M, Nagarathnam N, Electricity and Magnetism, 4th edition, Meerut, National Publishing Co.
3. Arora C.L., Electricity and Magnetism, S. Chand Publishing, 2014.

REFERENCE BOOKS:

1. David J Griffith, Introduction to Electrodynamics, 2nd Edition, New Delhi, Prentice Hall of India Pvt. Ltd, 1997.
2. Sehgal D.L, Chopra K. L and Sehgal N. K, Electricity and Magnetism, New Delhi, Sultan Chand & Co.,

III B.Sc (PH)	OPTICS & SPECTROSCOPY	19PH509
SEMESTER – V		HRS/WK - 5
CORE - IX		CREDIT - 5

OBJECTIVE:

Learn the basics of geometrical optics, Interference, Diffraction, Polarization and various types of spectroscopy.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1:Learn the basics of Geometrical Optics and Lenses

CO2:Study the concepts Interference and its applications

CO3:Acquire Knowledge about Diffraction and its applications

CO4:To Understand the concept of Polarization and its application in analyzing the optical activities

CO5:To Procure the Fundamental knowledge of Spectroscopy

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - V	COURSE CODE: 19PH509					COURSE TITLE: OPTICS & SPECTROSCOPY						Hours :5	Credits: 5
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	1.4	3.3	1.1	3.1	2.3	4.2	4.2	4.1	3.8	4.7	2.3	3.13	
CO2	1.2	3.5	1.3	3.2	2.6	4.4	4.3	4.1	3.9	4.2	2.1	3.16	
CO3	1.6	3.8	1.4	3.2	2.6	4.8	4.6	3.9	3.8	4.0	2.4	3.28	
CO4	1.8	3.8	1.4	3.2	2.4	4.5	4.1	3.9	4.2	3.5	2.1	3.17	
CO5	1.2	3.6	1.1	3.3	2.9	4.1	4.4	4.0	4.1	4.3	2.1	3.19	
Mean Overall Score											3.186		

Result: The Score for this course is 3.186 (High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs= $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs= $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT - I

(15 Hours)

Geometrical Optics: Spherical aberration and lenses – Methods of minimizing spherical aberration – Condition for minimum spherical aberration in the case of two lenses separated by

a distance – Chromatic aberration in lenses – Condition for achromatism of two thin lenses (In contact and out of contact) – Coma - Ramsden and Huygens's eyepieces– Angular dispersion – Dispersive power – combination of prisms to produce dispersion without deviation – Deviation without dispersion – Achromatic prisms Direct vision spectroscope.

UNIT - II

(15 Hours)

Interference: Colours of thin films – Air wedge – Determination of diameter of a thin wire by air wedge – Test for optical flatness – Michelson's Interferometer – Theory – Applications - λ , thickness of thin transparent material and resolution of spectral lines – Brewster's fringes – Refractive index of gases – Jamin's & Rayleigh's Interferometers – Stationary waves in light.

UNIT - III

(15 hours)

Diffraction: Fresnel diffraction – Diffraction at circular aperture, opaque circular disc, straight edge and narrow wire- Fraunhofer diffraction – single slit – double slit –Rayleigh's criteria – Resolving power of telescope, prism, microscope and grating.

UNIT - IV

(15 hours)

Polarization: Double refraction – Nicol prism – polarizer and analyzer – Huygens's explanation of double refraction in uniaxial crystals – Dichromatism – polaroid and their uses – plane, circularly and elliptically polarized light – production and detection – Optical Activity – Fresnel's explanation of optical activity – Specific rotatory power – Determination using Laurent's half shade polarimeter – Kerr effect and Faraday effect.

UNIT - V

(15 hours)

Spectroscopy: Introduction to spectroscopy - Electromagnetic spectrum - Characterization of electromagnetic radiation - Regions of the spectrum - Types of spectroscopy-Basic Principle, Instrumentation and applications of Infrared spectroscopy, RAMAN, NMR, ESR.

TEXT BOOKS:

1. Subramaniam N &Brijlal, Optics, S. Chand & Co. Pvt. Ltd., New Delhi, 1990.
2. R. Murugesan, Optics and Spectroscopy S. Chand & Co. Pvt. Ltd., New Delhi, 2009.

REFERENCE BOOKS:

1. Lipson S G, Lipson H and Tannhauser D S, Optical Physics, Cambridge University Press, 1995.
2. D. Halliday, R. Resnick and J. Waler, Fundamentals of Physics, Wiley NY 6th Edition, 2001.
3. R. P. Feynman, R. B. Leighton and M. Sands, The Feynman Lectures on Physics, Vols.I, II and III Narosa, New Delhi, 1998.
4. G.Aruldhas, Spectroscopy, Vendeur Book Vistas (New Delhi, India), 2009.

III B.Sc (PH)	NUCLEAR & RADIATION PHYSICS	19PH613
SEMESTER - VI		HRS/WK-5
CORE - XIII		CREDIT- 5

OBJECTIVE:

To study the nuclear structure, radioactive decay, particle accelerators, and working of nuclear reactor.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: To understand the Basic concept Nuclear Structure

CO2: To Acquire knowledge about Radio Active Decay

CO3: Understanding the Construction & Working of various Particle Accelerators

CO4: To study the Working of Nuclear reactors & Radiation

CO5: To study the Basic Classification of Elementary Particles

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - VI	COURSE CODE: 19PH613					COURSE TITLE: NUCLEAR & RADIATION PHYSICS						Hours: 5	Credits: 5
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	3.2	4.3	3.1	4.1	3.0	4.5	4.5	4.5	4.7	4.6	3.8	4.02	
CO2	3.1	3.9	3.3	4.2	3.1	4.7	4.5	4.8	4.3	4.4	3.7	4.00	
CO3	3.0	4.6	3.1	4.5	3.0	4.1	4.4	4.7	4.5	4.5	3.6	4.17	
CO4	3.4	3.8	3.2	4.5	3.1	4.5	4.8	4.3	4.7	4.6	3.6	4.04	
CO5	3.5	4.5	3.2	4.8	3.7	4.8	4.9	4.9	3.8	4.8	3.4	4.20	
Mean Overall Score											4.086		

Result: The Score for this course is 4.086 (High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High association** with Programme Outcome and Programme Specific Outcome

UNIT – I**(15 hours)**

Nuclear Structure: Nuclear spin – determination of magnetic dipole moment, electric quadrupole moment, parity of nuclei, isospin, theories of nuclear composition, proton and neutron hypothesis, proton – neutron hypothesis, nuclear forces – meson theory of nuclear forces.

Liquid drop model – Bethe Weizacker's mass formula – application to alpha decay – Bohr – Wheeler theory – shell model – evidences – theory – energy level diagram – spin orbit interaction – magic numbers – nuclear stability.

UNIT – II**(15 hours)**

Radioactive Decay: Radioactive disintegration – law of successive disintegration – transport and secular equilibrium – radioactive series – Geiger – Nuttall law – Age of earth – alpha particle disintegration energy – alpha particle spectra – theory of alpha decay (Qualitative treatment). Beta ray spectra – origin – neutrino theory of beta decay – electron capture – gamma rays – determination of wavelength by Diamond – crystal spectrometer – nuclear isomerism.

UNIT – III**(15 hours)**

Particle Accelerators And Detectors: Cyclotron – synchrocyclotron – Betatron – electron synchrotron – proton synchrotron (Bevatron)-GM counter – ionization chamber – bubble chamber – scintillation counter – photographic emulsion techniques.

UNIT – IV**(15 hours)**

Reactors And Radiation Physics: Nuclear fission – Chain reaction – four-factor formula – reactor theory – critical size of a reactor – general aspect of reactor design – reactor shielding – reactor control – classification of reactors – pressurized heavy water reactor – fast breeder reactor-Introduction to recent reactors.

Radiation hazards – biological effects of radiation - radiation sickness – radiation units and operational limits radiation survey meters – pocket dosimeter – control of radiation hazards – radiation therapy – radioisotopes used for therapy – nuclear medicine – industrial applications – food preservatives.

UNIT – V**(15 hours)**

Elementary Particles: Classification – types of interaction – symmetry and conservation laws – hadrons – leptons – baryons – mesons – strangeness – hyperons – antiparticles – antimatter – basic ideas about quarks – types of quarks.

TEXT BOOKS:

1. Brijlal and N.Subramaniam-Modern Physics
2. D.C. Tayal, Nuclear Physics, Himalaya Publishing House, 2011.
3. R. Murugeshan&Kiruthiga, Sivaprasath, Modern Physics, S. Chand & Co., 2009

REFERENCE BOOKS:

1. S. N. Ghoshal, Nuclear Physics, S Chand & Co. Edition, 2003.

2. M. L. Pandya, R.P.S. Yadav, Elements of Nuclear Physics, KedarNath& Ram Nath Publishers, 2000.
3. Nuclear Physics – J B Rajam, S chand Publishing Co.

III B.Sc (PH)	ASTROPHYSICS	19PH614
SEMESTER - VI		HRS/WK-5
CORE - XIV		CREDIT- 4

OBJECTIVE:

To study the Astronomy, celestial mechanics, various astronomical instruments, stellar structure and stellar evolution.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Study about the History of Astronomy and Celestial Mechanics

CO2: Learn the concepts of astronomical instrumentation

CO3: Acquire Knowledge of Stellar Magnitudes and Colors

CO4: Be familiar with the Stellar structure

CO5: Apply the knowledge of Stellar evolution

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - VI	COURSE CODE: 19PH614					COURSE TITLE: ASTROPHYSICS						Hours: 5	Credits: 4
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	3	3.8	4	3.5	3.5	2.8	3.5	3	4	3	3.5	3.41	
CO2	3.8	3.2	3	3	3.5	3.6	4	3.5	3	2.6	3.5	3.33	
CO3	3.5	4	3.2	2.5	3	3	3	3.5	3.5	3	3	3.2	
CO4	3	3.8	3	3.8	3	4	3	2.8	3.5	3	3.5	3.30	
CO5	4	2.5	3.5	3	3.5	2.5	3.5	3	3	3	2.5	3.09	
Mean Overall Score												3.27	

Result: The Score for this course is 3.27 (High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT - I

(15 hours)

Astronomy: History of Astronomy Celestial Mechanics; Distances in Astronomy; Magnitude Scale; Color-index Size and Time Scales

UNIT - II (15 hours)

Astronomical Instrumentation: Basic Optics; Optical Telescopes; Radio Telescopes; Infrared, Ultraviolet, X-ray, and Gamma-Ray Astronomy

UNIT - III (15 hours)

Stars: Stellar Magnitudes and Colors, Brightness and distance, Luminosity, temperature and spectral class, the motion of stars relative to the Sun, the masses of stars

UNIT - IV (15 hours)

Stellar Structure: Equations of Stellar Structure – Solutions to Equations of Stellar Structure, Toy Stellar Models: Homologous Stellar Models, the Radiative Stellar Envelope, and Fully Convective Stars with H^- Opacity, Observational Aspects of Stellar Atmospheres, Continuum Radiation, and Lines

UNIT - V (15 hours)

Stellar Evolution: Stellar Clusters Evolution of massive stars, Supernovae, Gamma-Ray bursts White Dwarfs, Chandrasekhar Limit, Neutron Stars, Pulsars GTR, Black holes.

TEXT BOOKS:

1. Bradley Carroll & Dale Ostlie, An Introduction to Modern Astrophysics , 2006.
2. T Padmanabhan, Theoretical Astrophysics: Vol. I-II-III, Cambridge University Press (2005).
3. Swapan K Saha, Diffraction-limited imaging with large and moderate telescopes, World Scientific,(2007).

REFERENCE BOOKS:

1. Chandrasekhar S, An Introduction to the Study of Stellar Structure, Dover Publications (1967).
2. Binney J, and Merrifield, Galactic Astronomy, Princeton University Press (1998).

III B.Sc (PH)	PHYSICS IN EVERYDAY LIFE	19SSPH52
SEMESTER - V		HRS/WK-0
SSC		CREDIT-2

OBJECTIVES:

- To acquire the knowledge about the fundamental parameters in physics and to understand their applications in daily life.
- To understand the flow of heat and its transmission in different forms and to develop a scientific quest among students.
- Transmission of sound waves, characteristics and their applications in human system.
- To discern the basic application of geographical physics, and their utilization in the field of Medication.
- To comprehend the basic ideas of physics in space science and communication networking.

UNIT – I

Mechanics: Weight – Mass - Force – Laws of Motion— Work - Energy – Power- Friction – Centre of Gravity – Torque – Momentum – Angular Momentum.

UNIT – II

Heat: Flow of Heat & Thermal Equilibrium (Applications – Riveting- bimetallic strip – Units of Heat energy – Transmission of heat – Conduction – Convection – Radiation – (Applications – Ocean Currents – Car Radiators – Ventilation – Wind system in atmosphere – Thermos flask).

UNIT – III

Sound & Optics: Sound waves – Doppler Effect – Power of Lens - Physics in the human body: The eyes as an optical instrument; vision defects; Rayleigh criterion and resolving power; sound waves and hearing; sound intensity; the decibel scale.

UNIT – IV

Geo & Medical Physics: Earthquake Richter scale - thunder and lightning - Lightning arrestors Cosmic showers - X-rays Ultrasound scan CT scan – MRI scan.

UNIT – V

Space Science & Communication: Newton's law of gravitation - Weather forecasting and communication satellites – Indian Satellites- Electromagnetic spectrum- Radio Waves AM & FM transmission and reception.

TEXT BOOKS:

1. University Physics by F. W. Sears, M. Zemansky, R. A. Freedman, and H. D. Young, Pearson Education
2. Fundamentals of Physics by D. Halliday, R. Resnick, J. Walker, John Wiley & Sons

III B.Sc (PH)	GEOPHYSICS	19EPH52A
SEMESTER – V		HRS/WK - 5
ELECTIVE – II Option(I)		CREDIT - 3

OBJECTIVE:

Understand formation of earth and solar system, geographical fields, concepts of seismology and geodynamics.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1:To know the information about the earth and solar system

CO2:To Learn the interpretation of Mathematical functions in geographical fields

CO3:Obtaining the knowledge about the Magnetic field on earth

CO4:To Learn the concepts of Seismology

CO5:To Learn the basics of Geodynamics

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - V	COURSE CODE:19EPH52A					COURSE TITLE: GEOPHYSICS						Hours: 5	Credits :3
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	2.1	2.8	1.0	2.4	2.5	3.3	3.3	3.8	3.1	3.2	1.1	2.6	
CO2	2.2	2.4	1.1	2.5	2.1	3.5	3.4	3.2	3.6	3.2	1.2	2.58	
CO3	2.3	2.7	1.0	2.7	2.3	3.1	3.7	3.2	3.1	3.3	1.1	2.59	
CO4	3.3	3.4	1.0	2.6	2.2	3.7	3.2	3.6	3.5	3.1	1.2	2.8	
CO5	2.6	2.0	1.0	2.5	2.1	3.0	3.1	3.0	2.0	3.4	1.1	2.34	
Mean Overall Score											2.582		

Result: The Score for this course is 2.582 (Moderate)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs= $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs= $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **Moderate** association with Programme Outcome and Programme Specific Outcome

UNIT - I

(15 Hours)

The Earth In The Solar System: Solar System Formation, Accretion, and the Early Thermal State

of the Earth-Rotation and Angular Momentum- The Sun-Planetary Formation-Early Thermal State of the Earth- Radioactive Decay-Radiometric Dating- Radioactivity as a Heat Source-Meteorites and the Bulk Composition of the Earth-Chondrites-Secondary Processing-Achondrites-Irons and Stony-Irons-The Terrestrial Planets-One-dimensional Earth's Structure-Lateral Heterogeneity in the Mantle

UNIT - II

(15 Hours)

The Earth's Gravitational Field: Global Gravity, Potentials, Figure of the Earth, Geoid-Gravitational Potential due to Nearly Spherical Body-The Poisson and Laplace Equations-Cartesian and Spherical Coordinate Systems-Spherical Harmonics-Global Gravity Anomalies- Gravity Anomalies and the Reduction of Gravity Data- Correlation between Gravity Anomalies and Topography-Flexure and Gravity.

UNIT - III

(15 Hours)

The Magnetic Field Of The Earth: The Main Field-The Internal Field- The External Field-The Magnetic Induction due to a Magnetic Dipole-Magnetic Potential due to More Complex Configurations-Power Spectrum of the Magnetic Field-Downward Continuation-Secular Variation.

UNIT - IV

(15 Hours)

Seismology: Introduction- Strain-Stress-Equations of Motion, Wave Equation, P and S-waves- From Vector to Scalar Potentials – Polarization-Solution by Separation of Variables- Plane Waves- Snell's Law-Fermat's Principle and Snell's Law- Ray Geometries of the Wave Field-Travel Time Curves and Radial Earth Structure-Surface Waves- Sensitivity Kernels-Excitation of Surface Waves-Dispersion: Phase and Group Velocity-Dispersion Curves- Seismology: Free Oscillation

UNIT - V

(15 Hours)

Geodynamics: Heat Flow- Heat Flow, Geothermal Gradient, Diffusion-Thermal Structure of the Oceanic Lithosphere-Thermal Structure of the Oceanic Lithosphere (cont.)-Bending, or Flexure, of Thin Elastic Plate-The Upper Mantle Transition Zone.

TEXT BOOKS:

1. Lowrie, William. Fundamentals of Geophysics. Cambridge, UK: Cambridge University Press, September 1997.
2. Fowler, C. M. R. The Solid Earth: An Introduction to Global Geophysics. Second Edition. Cambridge, UK: Cambridge University Press, 2004.

REFERENCE BOOKS:

1. Turcotte, Donald L., and Gerald Schubert. Geodynamics. 2nd ed. Cambridge, UK: Cambridge University Press, 2001.
2. Stein, Seth, and Michael Wysession. An Introduction to Seismology, Earthquakes and Earth Structure. Malden, MA: Blackwell Science, 2002.

III B.Sc (PH)	ENERGY PHYSICS	19EPH63B
SEMESTER - VI		HRS/WK-4
ELECTIVE – III Option(II)		CREDIT- 3

OBJECTIVE:

To study various conventional and non conventional energy sources, know about the biomass energy, geothermal energy.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Study about the Conventional Energy Sources

CO2: Learn about the Non-Conventional Energy Sources

CO3: Acquire Knowledge of Biomass energy

CO4: Be familiar with the geothermal energy

CO5: Apply the knowledge of Energy storage and impacts of Non-conventional energy

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - VI	COURSE CODE: 19EPH63B					COURSE TITLE: ENERGY PHYSICS						Hours: 4	Credits :3
Course Outcomes COs	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	3.2	3.8	4.1	3.5	3	2.8	3.5	3.1	4	3	3.2	3.38	
CO2	3.5	3.2	3.2	3	3.5	3.6	4	3.6	3	2.6	3.8	3.36	
CO3	3.5	4.1	3.2	2.6	3	3.2	3	3.5	3.5	3.5	3	3.28	
CO4	3.2	3.8	3	4	3	4	3.5	2.8	3.5	3	3.6	3.4	
CO5	4	3.5	3.5	3.2	3.5	2.5	3.5	3	4	3	3.5	3.38	
Mean Overall Score												3.36	

Result: The Score for this course is 3.36 (High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT – I (12 hours)

Conventional Energy Sources: World's reserve of commercial energy sources and their availability-various forms of energy- renewable and conventional energy systems- comparison and natural gas – availability –statistical details-applications- merits and demerits

UNIT- II (12 hours)

Non-Conventional Energy Sources: Renewable energy sources- solar energy- nature of solar radiation- components-solar heaters- crop dryers- space cooling-solar ponds-solar cookers-water desalination- photovoltaic generation basics- merits and demerits of solar energy

UNIT- III (12 hours)

Biomass energy: Biomass energy-classification- photosynthesis- biomass conversion process-gobar gas plants- wood gasification- ethanol from wood- advantages and disadvantages of biomass as energy source

UNIT – IV (12 hours)

Geothermal energy: Geothermal energy- wind energy- ocean thermal energy conversion (OTEC)-energy from waves and tides (basic ideas, nature, applications, merits and demerits)

UNIT – V (12 hours)

Energy storage and impacts of Non-conventional energy: Conversion of energy- patterns of energy consumption in domestic, industrial, transportation, agricultural sectors-conservation principles in these sectors- energy crisis and possible solutions- energy options for the developing countries- energy storage and hydrogen as a fuel (basics)-impact due to non-conventional energy sources-global warming

TEXT BOOKS:

1. Rajamaanar, 2004, Environmental Studies.

REFERENCE BOOKS:

1. Sukhatme, Solar Energy, McGraw-Hill Inc., US, 2nd Revised Edition,1997.

I B.Sc (PH)	PROPERTIES OF MATTER	19PH101
SEMESTER – I		HRS/WK - 4
CORE -1		CREDIT - 3

OBJECTIVE:

To know about the various properties of solids and liquids.

COURSE OUTCOMES (CO):

At the end of the Course the students should be able to exhibit

CO1: Learn the basics of elasticity and its importance in beams

CO2: Study the concepts of Elasticity and the various methods to determine the parameters experimentally

CO3: Acquire Knowledge of bending of beams

CO4: Be familiar with the surface tension

CO5: Study the concepts of viscosity and surface tension and the various methods to determine the parameters experimentally

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER – I	COURSE CODE: 19PH101					COURSE TITLE: PROPERTIES OF MATTER						Hours: 4	Credits: 3
Course Outcomes Cos	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	3.8	4	3.5	3.5	3.8	3.5	3	4	3	4	3.65	
CO2	3.5	3	3.5	3	3.5	4	4	4	4	3	4	3.59	
CO3	3	3.5	3	4	3.5	3	3	3.5	4	3.5	3	3.36	
CO4	3	4	4	3	2	3.5	3.5	3.5	3.5	4	2.5	3.32	
CO5	4	4	4	3.5	4	4	3.5	4	4	3.5	2.5	3.73	
Mean Overall Score												3.53	

Result: The Score for this course is 3.53 (High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs = $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT- I (12 Hours)

Elasticity-I: Hooke's law – stress – strain diagram – Modulus of elasticity - Relation between elastic constants – Poisson's ratio- Expressions for Poisson's ratio in terms of elastic constants – work done in stretching of a wire and twisting a wire.

UNIT- II (12 Hours)

Elasticity-II: Twisting couple on a cylinder – Torsional pendulum without mass– Rigidity modulus and moment of inertia – Rigidity modulus by static torsion - q , n and σ by Searle's method

UNIT- III (12 Hours)

Bending Of Beams: Bending moment-Expression for Bending moment-Cantilever-Expression for depression at the loaded end of a cantilever-Experiment to determine Young's modulus by Cantilever depression(Pin and Microscope)- Non-Uniform bending-Expression for depression at the midpoint of a beam subjected to Non uniform bending- Experiment to determine Young's modulus by Non uniform bending (using pin & microscope)-Uniform bending- Expression for elevation at the midpoint of a beam subjected to Uniform bending(using pin & microscope).

UNIT- IV (12 Hours)

Surface Tension: Molecular Interpretation - dimensions of surface tension – Excess of pressure over curved surfaces – Application to spherical and cylindrical drops and bubbles – Variation of surface tension with temperature – Jaeger's method.

UNIT- V (12 Hours)

Viscosity: Co-efficient of viscosity and its dimensions – Rate of flow of liquid in a capillary tube – Poiseuille's formula – Experiment to determine co-efficient of viscosity of a liquid(Constant volume method) – variation of viscosity of a liquid with temperature and pressure.

TEXT BOOKS:

1. BrijLal, N. Subrahmanyam, Properties of Matter, S. Chand Publications, 2002.
2. Murugesan .R, Properties of Matter and Acoustics, New Delhi, S. Chand & Co, 2006.

REFERENCE BOOKS:

1. C.L. Arora, P.S. Hemine., Physics for Degree students. First B.Sc Physics, 2010.
2. Mathur D.S., Elements of Properties of matter, S. Chand, 2006.

I B.Sc (PH)	MECHANICS	19PH102
SEMESTER - I		HRS/WK - 4
CORE -II		CREDIT - 3

OBJECTIVE:

To understand the basics of gravity, rigid bodies, space science and mechanism of particles.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Understand the basic ideas of Centre of Gravity, Centre of Pressure and Fluid dynamics.

CO2: Understand the various concepts of mechanics involved in Rigid bodies.

CO3: Acquire the concepts of space science

CO4: Acquire the knowledge about the projectile and friction

CO5: Apply the knowledge to the mechanism of system of particles.

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER - I	COURSE CODE: 19PH102					COURSE TITLE: MECHANICS						Hours: 4	Credits: 3
Course Outcomes Cos	Programme Outcomes POs					Programme Specific Outcomes PSOs						Mean Score of CO's	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6		
CO1	4	4	3.5	4	3.8	3.5	3	3.5	3.5	3.5	3	3.57	
CO2	2.5	4	3	4	4	3.5	3.5	3.5	4	4	3.5	3.59	
CO3	3.5	3.5	4	3.5	3.5	3.5	4	4	3.5	3	3.5	3.59	
CO4	3	4.5	3.5	4	3.5	4	3	3	3.5	4	3.5	3.59	
CO5	3	4	2.5	4	4	4	3.5	3.5	4	3.5	4	3.64	
Mean Overall Score												3.60	

Result: The Score for this course is 3.60(High)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Value Scaling					
Mean Score of COs= $\frac{\text{Total Values}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs= $\frac{\text{Total Mean Scores}}{\text{Total No. of COs}}$		

This course is having **High** association with Programme Outcome and Programme Specific Outcome

UNIT - I (12 Hours)

Statics, Hydrostatics and Fluid Mechanics: Centre of gravity- Centre of gravity of a Solid cone- Centre of gravity of a Solid hemisphere-Thrust-Centre of pressure- Vertical rectangular lamina.

Equation of continuity of flow- Energy of the fluid- Euler's Equation of unidirectional flow -Bernoulli's theorem

UNIT - II (12 Hours)

Mechanics Of Rigid Bodies: Rigid body- Moment of inertia- Radius of gyration- moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell - Bifilar pendulum-Compound pendulum-Determination of g and k .

UNIT - III (12 Hours)

Space Science: Rockets and satellites- Basic principles of rocket motion - Rocket equation, Thrust and acceleration- Escape velocity of multistage rockets. Liquid, solid and cryogenic propellant rockets- Space shuttle- Orbital velocity- Launching of satellites - Types of satellite Orbits.

UNIT - IV (12 Hours)

Projectiles and Friction: Introduction to projectile motion-Projectile on an inclined plane - Friction- Laws of friction- Sliding friction - Angle of friction- Cone of friction- Equilibrium of a body on a rough inclined plane acted upon by an external force- Rolling friction and stability.

UNIT - V (12 Hours)

Mechanics of a System of Particles: Generalized Co-ordinates- transformation equations-configuration space- principle of Virtual work- D' Alembert's principle- Lagrange's equations and its applications.

TEXT BOOKS:

1. Murugesan, Mechanics and Mathematical Methods, S.Chand and Co., 2005.
2. Gupta Kumar and sharma, Classical Mechanics, PragatiPrakashan, 2001.
3. C.L. Arora, Mechanics, S. Chand Publishing, 2014.

REFERENCE BOOKS:

1. Feynmann R.P, Leighton R.B and Sands M, The Feynmann Lectures on Physics, Vols 1, 2 and 3, Narosa, New Delhi, 1998.
2. Brijlal and Subramaniam, Mechanics and Electrodynamics, S. Chand, Kindle Edition, 2005.