ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) CUDDALORE-1

PG & RESEARCH DEPARTMENT OF PHYSICS

B.Sc (Physics)

SYLLABUS 2019-2020

P.G. and Research Department of Physics
B.Sc Physics
Curriculum Template

Sem	Part	Subject Code	Subject Title	Hrs	Cr
I	I	LT101T	Tamil- I/Hindi-I/French-I	4	3
	II	LE101T	English-I	4	3
	III	19PH101	Core Paper – I: Properties of matter	4	3
	III	19PH102	Core Paper – II: Mechanics	4	3
	III	PHP101	Core Practical – I	3	2
	III	AMT101Q	Allied Mathematics-I	8	6
	IV	19AEC101	AEC – English Communication*	1	1
	IV	VE101T	SEC- Value education	2	2
			Total	**30**	**23**
II	I	LT202T	Tamil -II/Hindi-II/French-II	4	3
	II	LE202T	English-II	4	3
	III	19PH203	Core Paper – III : Thermal Physics	4	3
	III	19PH204	Core Paper – IV: Waves and Oscillations	4	3
	III	PHP202	Core Practical – II	3	2
	III	AMT202T	Allied Mathematics-II	8	6
	IV	19AEC202	AEC- English Communication*	1	1
		EPD201T	SEC- Personality development	2	2
			Total	**30**	**23**
III	I	LT303T	Tamil -III/Hindi-III/French-III	4	3
	II	LE303T	English-III	4	3
	III	19PH305	Core Paper – V: Electricity and Magnetism	4	3
	III	19PH306	Core Paper – VI:Basic Electronics	4	3
	III	PHP303	Core Practical – III	3	2
	IV	ACH301S	Allied Chemistry	5	4
	III	ACHP301	Allied Chemistry Practical	3	2
	IV	AOBM401	SEC-Skill based course – Business organization and Management	3	3
			Total	**30**	**23**

	I	LT404T	Tamil -IV/Hindi-IV/French-IV	4	3
	II	LE404T	English-IV	4	3
	III	19PH407	CorePaper – VII: Atomic Physics	4	3
	III	19PH408	Core Paper – VIII: Applied Electronics	4	3
IV	III	PHP404	Core Practical – IV	3	2
	III	19ABC401	Interdisciplinary course(IDC)*- Biophysics	5	4
	III	19ABP401	Biophysics Practical	3	2
	IV		AEC- Environmental Science	3	3
			Total	**30**	**23**
	III	19PH509	Core Paper – IX: Optics & Spectroscopy	5	5
	III	19PH510	Core Paper – X: Solid state Physics	5	5
	III	19EPH51A 19EPH51B	Elective 1A: Digital Electronics Elective 1B: Numerical Methods & basic computer programming	5	4
V	III	19EPH52A 19EPH52B	Elective 2C: Geophysics Elective 2D:Fibre Optic Communication	5	4
	III	PHP505	Main Practical – V	6	3
		19SPH51	Skill development course- Electrical Wiring$	4	2
		19SSPH52	SSC ## (optional) Everyday Physics		2*
			Total	**30**	
	III	19PH611	Core Paper – XI: Relativity, Quantum Mechanics & Mathematical methods	5	5
	III	19PH612	Core Paper – XII: Nuclear & Radiation Physics	5	5
VI	III	19EPH63A 19EPH63B	Elective 3E:Astrophysics Elective 3F:Energy Physics	5	4
	III	JPH601	Elective 4: Project	5	4
	III	PHP606	Main Practical – VI	6	3
	IV	19SPH61	Skill development Course- Computer Literacy$	4	2
			Total	**30**	**23**
	V		Extension activities		2
			Grand Total	**180**	**140**

Extra courses –given extra credits -SSC

##- ONLY INTERNAL

- READING, WRITING,LISTENING ORAL TEST COMPONENT EXERCISES ONLY. SEPARATE TEST BASED ON THE ABOVE COMPONENT TO BE TESTED

YEAR- I SEM- I	Course Code: 19PH101	Course Title: PROPERTIES OF MATTER	HRS/WK 4	CREDIT 3

Course Outcomes

CO1	To study the basics of elasticity and its importance in beams
CO2	To study the twisting couple and rigidity modulus
CO3	Understanding the basic concept of bending of beams
CO4	Understand the basics of surface tension and its applications
CO5	To study the basics of viscosity and its applications

Mapping of course outcomes with the program specific outcomes

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												3.53

Result: The Score for this course isHigh

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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT- I: ELASTICITY-I   (12 Hours)

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

UNIT- II: ELASTICITY-II   (12 Hours)

Twisting couple on a cylinder – Torsional pendulum with and without masses– Rigidity modulus and moment of inertia – Rigidity modulus by static torsion - q, n and σ by Searle's method.

UNIT- III: BENDING OF BEAMS   (12 Hours)

Cantilever – Expression for bending moment – Expression for depression – Cantilever (static & dynamic methods)– Expression for time period and Experiment to determine Young's Modulus – Non-Uniform bending – Uniform bending – expressions - Experiment to determine Young's modulus using pin & microscope and optic lever – Experiment to determine Young's modulus by Koenig's method (Non-Uniform bending).

UNIT- IV: SURFACE TENSION   (12 Hours)

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: VISCOSITY   (12 Hours)

 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 – variation of viscosity of a liquid with temperature and pressure – Viscosity of a gas – Rankine's method Applications of viscosity.

TEXT BOOKS:-
1. Brij Lal & N. Subrahmanyam, *Properties of Matter*, S. Chand Publications, 2002.
2. Murugeshan .R, *Properties of Matter and Acoustics*, New Delhi, S. Chand & Co, 2006.
3. Mathur D.S., Elements of *Properties of matter*, S. Chand, 2006.

REFERENCE BOOKS:-
1. C.L. Arora, P.S. Hemine., *Physics for Degree students*. *First B.Sc Physics*, 2010.

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2. Brij Lal & Subrahmanyam, *Text Book of Sound*, New Delhi: N. Vikas Publishing House, 2008.

YEAR- I SEM- I	Course Code: 19PH102	Course Title: MECHANICS		HRS/WK 4	CREDIT 3

Course Outcomes

CO1	To understand the basic ideas of mechanics in the field of dynamics
CO2	To understand the basic ideas of rigid bodies
CO3	To study the concepts space science.
CO4	Understand the Projectiles and Friction
CO5	To acquire knowledge of mechanics of Single Particles, Rigid Bodies and System of Particles

Mapping of course outcomes with the program specific outcomes

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 isHigh

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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$	Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT-I: MECHANICS OF A SINGLE PARTICLE   (12 hours)

Centre of gravity- Centre of gravity of a solid and hollow cone- Solid and hollow 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: MECHANICS OF RIGID BODIES   (12 hours)

Rigid body- Moment of inertia- Radius of gyration- moment of inertia of a solid cylinder, cylindrical shell, solid sphere, spherical shell, hollow sphere with external and internal radii- Bifilar pendulum- Compound pendulum- Determination of g and k.

UNIT-III: SPACE SCIENCE   (12 hours)

Rockets and satellites- Basic principles of rocket motion Rocket equation, Thrust and acceleration- Escape velocity of multistage rockets.

UNIT IV: PROJECTILES AND FRICTION   (12 hours)

Projectile motion- Range of a projectile, maximum height reached and angle of projection for maximum height- Resultant velocity at a given instant(Definitions only)- Projectile on an inclined plane- Laws of friction- Sliding friction - Angle of friction- Cone of friction-acceleration down an inclined plane- Rolling friction and stability.

UNIT-V MECHANICS OF A SYSTEM OF PARTICLES   (12 hours)

Generalized Co-ordinates- transformation equations- configuration space- principle of Virtual work- D' Alembert's principle- Lagrange's equations and its applications-

TEXT BOOKS:-

1. Narayanamoorti and Nagarathnam, *Statics, Hydrostatics and Hydrodynamics*, National Publishing Company, III Edition, 1997.
2. Murugeshan, *Mechanics and Mathematical Methods*, S.Chand and Co., 2005.
3. Gupta Kumar and sharma, *Classical Mechanics*, Pragati Prakashan, 2001.
4. C.L. Arora, Mechanics, S. Chand Publishing, 2014.
5. David Kleppner , Robert Kolenkow, An Introduction to Mechanics McGrawHill, 2017.
6. A. P. French, Newtonian Mechanics , Viva Norton Student Edition, 2011

REFERENCE BOOKS:

1. Mathur. D.S., II Edition, *Mechanics*, S. Chand & Co., 2006.
2. Feynmann R.P, Leighton R.B and Sands M, Ther feymann, *Lectures on Physics*, Vols 1, 2 and 3-Narosa, New Delhi., 1998.
3. Brijlal and Subramaniyam, *Mechanics and Electrodynamics*, S. Chand, Kindle Edition, 2005.
4. Bhatia V.B., Classical Mechanics, Tamil Nadu Book House, 1997.
5. Charles Kittel, Walter Knight, Malvin Ruderman, Carl Helmholz, Burton Moyer, Mechanics: Berkeley Physics Course, 2017.
6. Somnath Datta Sunil Dutta, Mechanics , Pearson, 2010
7. Herbert Goldstein, Classical Mechanics, Pearson, 2011.
8. Rana & Joag, Rana, Classical Mechanics Tata McGraw-Hill Education, 2001.

YEAR – I		PHP101
SEMESTER - I	PRACTICAL – I	HRS/WK - 3
CORE – PRACTICAL - 1		CREDIT - 2

(Any nine out of the given 12 experiments**)**
1. Young's Modulus by Non-Uniform Bending – Pin and Microscope
2. Young's Modulus by Non-Uniform Bending – Optic Lever.
3. Rigidity modulus- Torsional Pendulum – n of a wire (without masses)
4. Rigidity modulus -Torsional Pendulum – n (with masses)
5. Sonometer – Determination of Frequency of tuning fork.
6. Sonometer – Determination of Specific Gravity of Solid and Liquid.
7. Surface tension by drop weight and Interfacial liquid– Drop Weight Method.
8. Comparison of Viscosity of two liquids
9. Focal Length and Refractive Index of Convex Lens (u-v method and conjugate foci methods for 'f' and Boy's method for R).
10. Spectrometer – µ of the hollow Prism
11. Potentiometer – Calibration of low range voltmeter.
12. Rigidity modulus by Static Torsion (mirror and telescope method).

YEAR- I SEM-II	Course Code: 19PH203	Course Title: THERMAL PHYSICS	HRS/WK 4	CREDIT 3

Course Outcomes

CO1	To acquire knowledge of transmission of heat and the laws associated with them To understand
CO2	the nature and the kinetic theory of gases
CO3	To study the concepts of gases at low temperature
CO4	To study the laws of thermodynamics and understand their applications
CO5	To study the basics of Maxwell's thermo-dynamical relations and their importance

Mapping of course outcomes with the program specific outcomes

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 isHigh

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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT- I: HEAT AND THERMODYNAMICS (12 Hours)

HEAT: 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: KINETIC THEORY OF GASES (12 Hours)

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 - C_P , C_V and γ of a gas - theory of Brownian motion – Langevin's theory.

UNIT- III: GASSES (12 Hours)

Molar heat capacities – Mayer's relation reversible adiabatic and isothermal changes– equations – Clement and Desormers method of determining C_p / C_v – Andrew's work on CO_2– regenerative cooling – the Linde process – Liquid air, oxygen, hydrogen.

UNIT- IV: LOW TEMPERATURE PHYSICS (12 Hours)

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: PHASE TRANSITION (12 Hours)

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. M. Narayanamoorthy and N. Nagarathinam, Heat, National publishing Co, Chennai, Eight Edition, 1987.
3. Murugeshan.R., Thermal Physics., S. Chand & Co., 2009.
4. Brijlal and Subramanyam, *Heat and Thermodynamics*, S. Chand & Co., 2000.
5. Gupta and Kumar, *Elements of Statistical Mechanics*, Meerut: Pragathi Prakashan, 2004.

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.

YEAR- I SEM- II	Course Code: 19PH204	Course title WAVES AND OSCILLATIONS	HRS/WK 4	CREDIT 3

Course Outcomes

CO1	Understand the basics of SHM
CO2	Understand the wave nature of transverse wave
CO3	Understand the wave nature of longitudinal wave
CO4	Study the waves in more than One Dimension
CO5	Understand the Fluids as continuous media

Mapping of course outcomes with the program specific outcomes

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	2.8	4.1	3.5	3	2.8	3.5	3.1	4	3.4	3.2	3.32
CO2	3.5	3.2	3	3	3.5	3.6	4	3.6	3	2.6	3.5	3.31
CO3	3.5	4.2	3.2	2.8	3	3.2	3	3.5	3.7	3.5	3.2	3.34
CO4	3.2	3.6	3	4	3	3.5	3.5	2.8	3.5	3.1	3.6	3.34
CO5	4.1	3.5	3.7	3.2	3.5	2.5	3.5	3	4.1	3.2	3.5	3.43
Mean Overall Score												3.34

Result: The Score for this course isHigh

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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$	Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT - I: SIMPLE HARMONIC MOTION (12 Hours)

Simple harmonic motion – Velocity and acceleration in SHM – Energy of a simple harmonic oscillator –Examples of simple harmonic oscillators in electrical systems – Superposition of two simple harmonic vibrations in one dimension–Damped harmonic oscillation – Forced oscillator.

UNIT - II: TRANSVERSE WAVES (12 Hours)

Introduction to transverse waves – Velocities in wave motion – The transverse wave equation – Solution of the transverse wave equation – Standing waves on a string of fixed length – Energy of a vibrating string – Standing wave ratio – Wave groups and group velocity – Doppler effect .

UNIT - III: LONGITUDINAL WAVES (12 Hours)

Introduction to longitudinal waves – Sound waves in gases – Energy distribution in sound waves – Intensity of sound waves – Longitudinal waves in a solid - Example of earthquake – Reflection and transmission of sound waves at boundaries – Noise and music – Limits of human audibility – The decibel unit – Diffraction of sound waves – Introduction to acoustic transducers – Acoustics of auditoriums and halls – Reverberation time.

UNIT - IV: WAVES IN MORE THAN ONE DIMENSION (12 Hours)

Plane wave representation in two and three dimensions – Wave equation in two dimensions – Solution by method of separation of variables – Introduction to normal modes in two dimensional case – Reflection and transmission of a three-dimensional wave at a plane boundary.

UNIT - V: CONTINUOUS MEDIA (FLUIDS) (12 Hours)

Fluids as continuous media – Flow properties of liquids – Flow of ideal liquids – Bernoulli's theorem – Flow of real liquids – Viscosity – Newtonian and non-Newtonian fluids – Reynolds number – Streamline and turbulent flows – Stroke's law – Surface energy and surface tension.

Textbooks

1. H. J. Pain, The Physics of Vibrations and Waves, John Wiley, (2005), 6th Edition, for Units I, II & III.
2. D. S. Mathur, Elements of Properties of Matter, S. Chand & Co., (2005), 11th Edition, for Units IV & V
3.

Reference Books

1. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, John Wiley & Sons (2004), 7 th Edition.
2. Berkeley Physics Course-Waves: Volume-III, McGraw Hill, (1969).
3. A. P. French, Vibrations and Waves (M.I.T Introductory Physics Series), CRC Press, (1971).
4. Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, Fundamentals of Acoustics, John Wiley, (2000).
5. Richard P. Feynman, Robert B. Leighton, Matthew Sands, Feynman Lectures on Physics: The Definitive and Extended Edition. Addison-Wesley, (2005), 2 nd Edition.
6. F. H. Newman and V. H. L. Searle, The General Properties of Matter, Edward Arnold (1961).
7. B. H. Flowers, Properties of Matter, John Wiley, (1970).

YEAR – I		PHP202
SEMESTER - II	PRACTICAL - II	HRS/WK - 3
CORE – PRACTICAL - 2		CREDIT - 2

(Any nine out of the given 12 experiments)
1. Young's Modulus by Uniform Bending – Pin and Microscope
2. Young's Modulus by Uniform Bending – Optic Lever.
3. Thermal Conductivity of the Bad Conductor – Lee's Disc Method.
4. Specific heat capacity of liquid by method of mixtures (Half-time Correction).
5. Specific heat capacity of liquid by Newton's Law of cooling.
6. Spectrometer i–d Curve.
7. Focal Length R & µ of a concave lens.
8. Potentiometer – Calibration of an Ammeter.
9. Sonometer – Comparison of Linear Densities
10. Air wedge thickness of a wire
11. M and B_H – TanC – Deflection and vibration Magnetometer.
12. Figure of merit of a table galvanometer.

YEAR- II SEM- III	Course Code: 19PH305	Course title ELECTRICITY AND MAGNETISM		HRS/WK 4	CREDIT 3

Course Outcomes

CO1	To Understand The Electrostatics Concept And The Laws Associated With Them
CO2	To acquire knowledge of chemical effects of electric current
CO3	To study the concepts of DC circuits
CO4	To study the basics of AC
CO5	To understand the concepts of magnetic materials

Mapping of course outcomes with the program specific outcomes

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	2.5	4.1	3.5	3	2.5	3	3.1	4	3.2	3.2	3.19
CO2	3.3	3.2	3	3	3.5	2.8	4	3.6	3	2.3	3.5	3.2
CO3	3.5	4.2	3.5	2.8	3	3.2	3.5	3.5	3.7	4	3.2	3.46
CO4	3.2	3.8	3	4.2	3	3.5	3.5	2.8	3.6	3.5	3.6	3.42
CO5	4.3	3.5	3.7	3.2	3.8	2.5	3.5	3.2	4.3	3.2	3.5	3.51
Mean Overall Score												3.36

Result: The Score for this course isHigh

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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$ Mean Overall Score of COs= $\frac{Total\ Mean\ Scores}{Total\ No.of\ COs}$

UNIT I   ELECTROSTATICS   (12 hours)

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 CHEMICAL EFFECTS OF ELECTRIC CURRENT (12 hours)

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 TRANSIENT CURRENT (12 hours)

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 A.C AND ELECTROMAGNETIC INDUCTION (12 hours)

Power in AC circuit – wattless current- choke coil construction and working of transformers- energy losses – AC motors – single phase, three phases – star and delta connection –electric fuses- circuit breakers. Inductances in series and parallel-Self inductance of co-axial cylinders- Single phase induction motor

UNIT V MAGNETIC PROPERTIES OF MATERIALS (12 hours)

Susceptibility- permeability- intensity of magnetization and the relation B= u(H+M), 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. Murugeshan R, *Electricity and Magnetism*, 8th Edition, New Delhi, S. Chand & Co., 2006.
2. Brijlal and N. Subramanian, Electricity and Magnetism, Agra, Ratan & Prakash, 6th Edition.
3. Narayanamoorthy M & Nagarathnam N, *Electricity and Magnetism*, Meerut, National Publishing Co., 4th edition.
4. Tewari. K. K, *Electricity and Magnetism*, 3rd Edition, New Delhi, S. Chand & Co., 2001.

5. C.L. Arora, *Electricity and Magnetism*, S. Chand Publishing, 2014.
6. D.S. Mathur, *Electricity and Magnetism,* S. Chand, 12th Edition.

REFERENCE BOOK:

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.,
3. Brij Lal, Subramanian N and Jivan Seshan, *Mechanics and Electromagnetics*, New Delhi, Eurasia Publishing House Pvt .Ltd, 2005.

YEAR- I SEM- III	Course Code: 19PH306	Course title BASIC ELECTRONICS	HRS/WK 4	CREDIT 3

Course Outcomes

CO1	Understand the working of Diode and its applications.
CO2	Understand the working of Transistor.
CO3	Understand the working of Oscillators
CO4	Understand the Wave Shaping Circuits and Multi Vibrators
CO5	Understand the various Application of Electronics

Mapping of course outcomes with the program specific outcomes

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 isHigh

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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,MeanScores}{Total\,No.of\,COs}$

UNIT – I : DIODES AND   ITS APPLICATIONS   **(12 hours)**

Bonding, Band gap of semiconductors –Types of semiconductors-Elemental and Compound semiconductors-intrinsic and extrinsic semiconductors – effect of temperature on Fermi level – PN junction diode – Zener diode-LED - Half-wave , full-wave and bridge rectifier – expression for efficiency and ripple factor – choke input filter – capacitor input filter – π section filter – zener regulated power supply

UNIT –II : TRANSISTORS   **(12 hours)**

Different modes of operation – transistor biasing –characteristics in CB & CE modes –H-Parameters- α and β of a transistor. RC coupled amplifier – frequency response curve – analysis of mid-frequency region – classification of amplifiers – class A power amplifier – Push-pull, class B power amplifier – Emitter follower.

UNIT –III : OSCILLATORS   **(12 hours)**

Voltage gain of a feedback amplifier – Barkhausen criterion – Hartley, Colpitt's, phase shift and Weinbridge oscillators – expression for frequency of oscillations and condition for sustained oscillations in each case – crystal oscillator – frequency stability.

UNIT –IV : WAVE SHAPING CIRCUITS AND MULTI VIBRATORS   **(12 hours)**

Clipping and clamping circuit – biased clipper – integrating and differentiating circuits – RC time constants. Multivibrators – Astable – Mono stable and bi-stable multivibrators – Schmitt trigger

UNIT –V: APPLICATION OF ELECTRONICS   **(12 hours)**

Passive devices – resistors – Capacitors – Colour coding – TV antennas – dipole – folded – Yagi – Dish – DTH – Mobile communication system.

TEXT BOOKS

1. B.L. Theraja, *Electronics,* S. Chand Publishing, 2005.
2. V. K Mehta, *Principles of electronics*, S. Chand & Co., 2005.
3. M.K. Bagde and S. P. Singh, *Elements of Electronics*, S. Chand Publishing, 2000.
4. K.V. Ramanan, *Functional electronics*, McGraw-Hill Inc., US, 1984.
5. M. Arul Thalapathi, *Basic and Applied Electronics*, Comtek publisher, 2005.

REFERENCE BOOKS

1. A. Malvino, *Electronics Principles*, McGraw Hill Education, 7th Edition, 2006.
2. Allen Mottershed, *Electronic Devices and Circuits*, Goodyear Pub. Co., 1973.
3. Manna, Solid state electronics, Tata McGraw Hill
4. B. Grob, *Basic electronics*, McGraw Hill Education, 12th Edition.
5. R.S. Sedha, *Applied Electronics,* S. Chand & Company Ltd; 2nd New Edition, 2000.

YEAR – II		PHP303
SEMESTER – III	**Practical - III**	HRS/WK - 3
CORE – PRACTICAL – III		CREDIT - 1

(Any nine out of the given 12 experiments**)**
1. Compound Pendulum
2. Bifilar Pendulum
3. Field along the axis of Circular Coil - B_H
4. Young's modulus-cantilever - oscillations dynamic method-pin and microscope.
5. Young's modulus cantilever - scale and telescope
6. Sonometer ac frequency using steel wire
7. Sonometer ac frequency using brass wire
8. Spectrometer-grating-normal incidence method
9. Spectrometer-grating-minimum deviation method
10. Surface Tension of the Liquid – Capillary Rise Method
11. Young's Modulus by Koenig's method(Non-Uniform Bending)
12. Potentiometer- Resistance- Specific Resistance of a wire

YEAR-II SEM- III	Course Code: APH301	Course Title: ALLIED PHYSICS		HRS/WK 5	CREDIT 4

Course Outcomes

CO1	Study about Bending of beams and sound
CO2	Learn concepts of Electricity and Magnetism
CO3	Using the computers and enjoy in the world of Information Technology
CO4	Be familiar with Interference and optical activity
CO5	Apply the knowledge of Quantum mechanics and Electronics

Mapping of course outcomes with the program specific outcomes

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	3.5	2.5	4.1	3.5	3.5	2.5	3	3.5	4.2	3.2	3.2	3.33
CO2	3.6	3.2	3.6	3	3.5	2.8	4.1	3.6	3.7	2.3	3.5	3.35
CO3	3.5	4.3	3.5	2.8	3	3.6	3.5	3.5	3.7	4.2	3.3	3.53
CO4	3.2	3.6	3	4	3	3.5	3.4	2.8	3.4	3.5	3.6	3.36
CO5	4	3.5	3.5	3.2	3.6	2.5	3.5	3.2	4	3.2	3.5	3.42
Mean Overall Score												3.40

Result: The Score for this course is 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= $\dfrac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\dfrac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

YEAR – II		APH301
SEMESTER – III	ALLIED PHYSICS	HRS/WK - 5
ALLIED		CREDIT - 4

UNIT- I: PROPERTIES OF MATTER & ACOUSTICS   (15 hours)

Bending of beams: Non uniform bending-Torsion of a wire-Torsional bendulum.

Sound: Transverse vibrations of a stretched string- expression for the velocity of transverse wave – laws of transverse vibrations- A.C frequency measurement using sonometer- velocity of sound in a gas-Ultrasonics-production and uses.

UNIT- II: ELECTRICITY & MAGNETISM   (15 hours)

Capacitor- energy of charged capacitors- loss of energy due to sharing of charges DC circuits – growth and decay of charge containing resistance and capacitor (RC) circuit & inductance and resistance (LR) circuit - potentiometer-measurement of internal resistance of a cell and unknown resistances – Moment, Tan C and pole strength of a magnet

UNIT- III: OPTICS   (15 hours)

Interference-Wedge shaped film-Air wedge-Description- Test for Optical flatness of glass plate-Determination of diameter of a thin wire by air wegdge-spherical aberration – minimizing spherical aberrtion by using two thin lenses in contact-chromatic aberration- achromatic combination of two thin lenses in contact- optical activity-specific rotatory power-polarimeter

UNIT- IV: RELATIVITY & QUANTUM MECHANICS   (15 hours)

Elements of relativity and Postulates of theory of relativity- Lorentz transformation equations- derivation Addition of velocities-twin paradox Minkowski's four dimensional space.

Quantum mechanics: De Broglie's waves - Uncertainty principle- postulates of wave mechanics- - Schrödinger's equation (Time dependent one dimensional) - application to a particle in a box.

UNIT- V: ELECTRONICS   (15 hours)

FET-characteristics-parameters-FET as amplifier-IC-SSI LSI MSI-VLSI IC fabrication-Diode-flip flops-RS flip flops-D flip flops-JK flip flops .

Text Books

1. Principle of physics-Brijlal Subramaniyam
2. R. Murugesan, *Allied Physics*, S. Chand Publishing, 2005.
3. Brijlal Subramaniyam, *Text book of Sound*, Vikas Publishing, 2nd Revised Edition.
4. V.K.Metha. S Chand, *Principle of Electronics*, 7th Revised Edition, 2005.

YEAR – II		APHP301
SEMESTER – III	ALLIED PRACTICAL	HRS/WK - 3
ALLIED		CREDIT - 2

LIST OF PRACTICALS

(Any TEN out of the Thirteen experiments can be selected**)**

1. Determination of Young's modulus –non-uniform bending   -Pin and microscope.
2. Determination of Rigidity modulus- Torsional pendulum (without masses).
3. Determination of Rigidity modulus – Static torsion
4. Sonometer –frequency of tuning fork.
5. Sonometer – A.C frequency - Steel and Brass wire.
6. Air wedge – thickness of a wire.
7. Spectrometer – Grating-Minimum deviation
8. Potentiometer – Measurement of Internal resistance of a cell.
9. Figure of merit of a galvanometer (Table galvanometer).
10. Construction of AND, OR NOT gates using diodes and transistors.
11. NAND gate as a universal gate.
12. Field along the axis of a circular coil-deflection magnetometer-B_H and M-Tan C.
13. RS- Flip flop, Clocked RS Flip flops.

YEAR- II SEM- IV	Course Code: 19PH407	Course Title: ATOMIC PHYSICS		HRS/WK 4	CREDIT 3
Course Outcomes					
CO1	Acquire knowledge through discharge phenomenon through gases				
CO2	Get the basic knowledge of atomic structure				
CO3	Acquire knowledge ionization potential and splitting of energy levels				
CO4	Understand the concept of photoelectricity and verifications by experiments.				
CO5	Understand the production and properties of X-rays.				

Mapping of course outcomes with the program specific outcomes

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	3.5	3	3.2	3.5	4	3	3	3.5	3.5	4	3.38
CO2	4	4	3.5	4	4	4	2.5	3.5	4	3.5	4	3.73
CO3	4	3.5	4	3.5	3	3.5	4	4	4	3	3.5	3.64
CO4	3.5	3.5	4	3.5	3.5	3.5	4	3.5	3.5	3.5	3.5	3.59
CO5	4	4	3.5	3.5	4	4	3.5	4	4	3.5	3	3.73
Mean Overall Score												3.61

Result: The Score for this course is 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= $\dfrac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$	Mean Overall Score of COs= $\dfrac{Total\,MeanScores}{Total\,No.of\,COs}$

UNIT I: DISCHARGE PHENOMENON THROUGH GASES   (15 hours)

Motion of a charge in transverse electric and magnetic fields – specific charge of electron – Dunnington's method – Magnetron method – positive rays – Thompson parabola method – Aston and Dempster's mass spectrograph.

UNIT II: ATOMIC STRUCTURE   (15 hours)

Vector atom model – Pauli's exclusion principle – explanation of periodic table – various quantum numbers – angular momentum and magnetic moment – coupling schemes – LS and JJ coupling – spatial quantization – Bohr magnetron Spectral terms and notations – selection rules – intensity rule and interval rule.

UNIT III: IONISATION POTENTIAL AND SPLITTING OF ENERGY LEVELS   (15 hours)

Excitation and ionization potential – Davis and Goucher's method – Zeeman effect – Larmor's theorem – Debye's explanation of normal Zeeman effect – Anomalous Zeeman effect – theoretical explanation- Lande's 'g' factor and explanation of splitting of D1 and D2 lines of sodium – Paschen Back effect – theory – Stark effect (Qualitative treatment only)

UNIT IV: PHOTOELECTRICITY   (15 hours)

Photo electricity: Photoelectric emission laws – Lenard's experiment- Richardson and Compton experiment- Einstein photoelectric equation - experimental verification of Einstein's photoelectric equations by Millikan's experiment.

UNIT V: X-RAYS   (15 hours)

X-RAYS: Continuous and characteristic X-RAY spectra absorption of X-RAYS by matter- concept of reciprocal lattice, Compton effect-derivation of expression for change in wavelength-experimental verification

TEXTBOOKS

1. R. Murugeshan, *Modern Physics*, S. Chand & Co., New Delhi, 2009.
2. N. Subramanian and Brij Lal, *Atomic and Nuclear Physics*, S. Chand & Co., 2013.
3. J. B. Rajam, *Atomic Physics*, S. Chand Publishing Co., 2010.

REFERENCE BOOKS

1. A. B. Gupta and Dipak Ghosh, *Atomic Physics*, Books and Allied Publishers, 2nd Edition, 2009.
2. J. H. Hamilton and Yang, *Modern Physics*, McGraw Hill Publication, 1996.
3. A. Beiser, *Concepts of Modern Physics*, Tata McGraw Hill, New Delhi, 1997.
4. D. Halliday, R. Resnick and J. Walker, *Fundamentals of Physics*, Willey NY, 6th Edition, 2001.

YEAR- II SEM- IV	Course Code: 19PH408	Course Title: APPLIED ELECTRONICS	HRS/WK 4	CREDIT 3

Course Outcomes	
CO1	Obtained knowledge of special devices and applications
CO2	Study of various linear operational amplifier circuits
CO3	Study of various applications of operational amplifier
CO4	Basis introduction of555 timer and locked loop
CO5	Acquire basis ideas of D/A and A/D converter

Mapping of course outcomes with the program specific outcomes

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	3.5	3.5	4	3.5	4	4	3	3	3	3.55
CO2	4	3.5	2.5	4	3.5	4	3.5	3.5	3	3	4	3.50
CO3	3.5	4	3.5	4	4	4	4.5	3.5	3.5	3.5	3.5	3.77
CO4	3.5	3.5	4	3.5	4	3.5	4	4	3	3.5	3.5	3.64
CO5	4	4	4	4	3.5	3	4	3.5	3	3.5	3.5	3.64
Mean Overall Score												3.62

Result: The Score for this course is 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 = $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$ Mean Overall Score of COs = $\frac{Total\ MeanScores}{Total\ No.of\ COs}$

UNIT - I : SPECIAL DEVICES AND APPLICATIONS   (15 hours)

FET _ Characteristics – parameter FET as amplifier – FET as VVR – MOSFET – Depletion and enhancement – UJT characteristics – UJT as relaxation oscillator – SCR characteristics.

UNIT - II : LINEAR OPERATIONAL AMPLIFIER CIRCUITS   (15 hours)

OPAMP – Parameters – inverting and Non-inverting amplifier – gain – Miller effect – Virtual ground – offset voltage – offset current – PSRR - CMRR. OPAMP – Sign and scale changer – adder, subtractor and averager – integrator and differentiator – voltage follower – solving simultaneous linear equation.

UNIT – III : APPLICATIONS OF OPERATIONAL AMPLIFIER   (15 hours)

OP AMP logarithmic amplifer – antilogarthmic amplifer – Logarithmic multiplier – Logarithmic divider.Comparator – Schmitt trigger – Astable multivibrator – Monostable multivibrator – Bistable multivibrator – Wein Bridge oscillator – phase shift oscillator.

UNIT - IV : 555 TIMER AND PLL   (15 hours)

555 Timer block diagram - Monostable operation – Astable operation – Schmitt trigger.Phase – Locked Loops (PLL): Basic principles – phase Detector- Analog phase detector – Digital phase detector – voltage controlled oscillator (VCO).

UNIT - V : D / A AND A / D CONVERTER   (15 hours)

Weighted resistor D/A converter – 4bit R-2R ladder DAC – Analog to Digital converter – Stair case ADC– Successive approximation ADC.

TEXT BOOKS
1. Vijayendran, *Integrated Physics*, S.Viswanathan Pvt. Ltd., 2009.
2. R.S. Sedha, *Applied Electronics,* S. Chand & Company Ltd., 2nd New Edition, 2000.
3. M. Arul Thalapathi, *Basic and Applied Electronics,* Cometak Publisher Chennai, 2005.

REFERENCE BOOKS

1. Albert Paul Malvino, *Digital Computer Electronics,* TMH Edition, 1992.
2. I.J. Jagrath, *Electronics – Analog and Digital,* Prentice – Hall of India, New Delhi, 1999.
3. Malvino Leach, *Digital Principles and Applications,* 4th Edn., Tata McGraw Hill, 1992.
4. Jacob Millman and Christos C. Halkias, *Integrated Electronics*, McGraw Hill International, 1971.
5. D. Roy Choudhury and Shall Jain, *Linear Integrated Circuits,* New age International (p) Ltd., 2010.
6. Ramakant A. Gayakwad, *OP–AMPS and Linear Integrated Circuits,* Prentice Hall of India, 1994.

YEAR – II		PHP404
SEMESTER – IV	PRACTICAL – IV	HRS/WK - 3
CORE – PRACTICAL – IV		CREDIT - 2

(Any nine out of the given 12 experiments**)**

1. Potentiometer –comparison of EMF
2. Potentiometer- high range voltmeter
3. Spectrometer-dispersive power of a grating
4. Spectrometer-dispersive power of a prism
5. P.O.Box –resistance-temperature coefficient
6. Field along the axis of a circular coil deflection magnetometer – M – Null deflection method.
7. Carry Fosters bridge- temperature Co-efficient of Resistance
8. Field along the axis of a circular coil vibrational magnetometer
9. Variation of resistance with temperature (thermistor)
10. LCR Studies- Two Resistors- Two Capacitors – Two Inductors

YEAR-II SEM- III & IV	Course Code: APH301/401	Course Title: ALLIED PHYSICS		HRS/WK 5	CREDIT 4

Course Outcomes

CO1	Understand the properties of matter & acoustics
CO2	Understand the electricity & magnetism in electrical circuit
CO3	Understand the principal of optics and applications
CO4	Occur the basic knowledge of relativity & quantum mechanics
CO5	Explain the various electric IC in electrical circuit

Mapping of course outcomes with the program specific outcomes

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	3.5	2.5	4.1	3.5	3.5	2.5	3	3.5	4.2	3.2	3.2	3.33
CO2	3.6	3.2	3.6	3	3.5	2.8	4.1	3.6	3.7	2.3	3.5	3.35
CO3	3.5	4.3	3.5	2.8	3	3.6	3.5	3.5	3.7	4.2	3.3	3.53
CO4	3.2	3.6	3	4	3	3.5	3.4	2.8	3.4	3.5	3.6	3.36
CO5	4	3.5	3.5	3.2	3.6	2.5	3.5	3.2	4	3.2	3.5	3.42
Mean Overall Score												3.40

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$	Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

YEAR – II		APH401
SEMESTER – IV	ALLIED PHYSICS	HRS/WK - 5
ALLIED		CREDIT - 4

UNIT- I: PROPERTIES OF MATTER & ACOUSTICS   (15 hours)

Bending of beams: Non uniform bending-Torsion of a wire-Torsional bendulum.

Sound: Transverse vibrations of a stretched string- expression for the velocity of transverse wave – laws of transverse vibrations- A.C frequency measurement using sonometer- velocity of sound in a gas-Ultrasonics- production and uses.

UNIT- II: ELECTRICITY & MAGNETISM   (15 hours)

Capacitor- energy of charged capacitors- loss of energy due to sharing of charges DC circuits – growth and decay of charge containing resistance and capacitor (RC) circuit & inductance and resistance (LR) circuit - potentiometer- measurement of internal resistance of a cell and unknown resistances – Moment, Tan C and pole strength of a magnet

UNIT- III: OPTICS   (15 hours)

Interference-Wedge shaped film-Air wedge-Description- Test for Optical flatness of glass plate-Determination of diameter of a thin wire by air wegdge- spherical aberration – minimizing spherical aberrtion by using two thin lenses in contact-chromatic aberration- achromatic combination of two thin lenses in contact- optical activity-specific rotatory power-polarimeter

UNIT- IV: RELATIVITY & QUANTUM MECHANICS   (15 hours)

Elements of relativity and Postulates of theory of relativity- Lorentz transformation equations- derivation Addition of velocities-twin paradox Minkowski's four dimensional space.

Quantum mechanics: De Broglie's waves - Uncertainty principle- postulates of wave mechanics- - Schrödinger's equation (Time dependent one dimensional) - application to a particle in a box.

UNIT- V: ELECTRONICS   (15 hours)

FET-characteristics-parameters-FET as amplifier-IC-SSI LSI MSI-VLSI IC fabrication-Diode-flip flops-RS flip flops-D flip flops-JK flip flops .

Text Books

5. Principle of physics-Brijlal Subramaniyam
6. R. Murugesan, *Allied Physics*, S. Chand Publishing, 2005.
7. Brijlal Subramaniyam, *Text book of Sound*, Vikas Publishing, 2nd Revised Edition.
8. V.K.Metha. S Chand, *Principle of Electronics*, 7th Revised Edition, 2005.

YEAR – II		APHP401
SEMESTER – IV	ALLIED PRACTICAL	HRS/WK - 3
ALLIED		CREDIT - 2

LIST OF PRACTICALS

(Any TEN out of the Thirteen experiments can be selected**)**

14. Determination of Young's modulus –non-uniform bending   -Pin and microscope.
15. Determination of Rigidity modulus- Torsional pendulum (without masses).
16. Determination of Rigidity modulus – Static torsion
17. Sonometer –frequency of tuning fork.
18. Sonometer – A.C frequency - Steel and Brass wire.
19. Air wedge – thickness of a wire.
20. Spectrometer – Grating-Minimum deviation
21. Potentiometer – Measurement of Internal resistance of a cell.
22. Figure of merit of a galvanometer (Table galvanometer).
23. Construction of AND, OR NOT gates using diodes and transistors.
24. NAND gate as a universal gate.
25. Field along the axis of a circular coil-deflection magnetometer-B_H and M-Tan C.
26. RS- Flip flop, Clocked RS Flip flops.

YEAR-III SEM- V	Course Code: 19PH509	Course Title: OPTICS & SPECTROSCOPY	HRS/WK 5	CREDIT 5

Course Outcomes

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

Mapping of course outcomes with the program specific outcomes

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	3.5	3	3.2	3.5	4	3	3	3.5	3.5	4	3.38
CO2	4	4	3.5	4	4	4	2.5	3.5	4	3.5	4	3.73
CO3	4	3.5	4	3.5	3	3.5	4	4	4	3	3.5	3.64
CO4	3.5	3.5	4	3.5	3.5	3.5	4	3.5	3.5	3.5	3.5	3.59
CO5	4	4	3.5	3.5	4	4	3.5	4	4	3.5	3	3.73
Mean Overall Score												3.61

Result: The Score for this course is 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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$ Mean Overall Score of COs= $\frac{Total\ MeanScores}{Total\ No.of\ COs}$

UNIT – I: GEOMETRICAL OPTICS   (15 hours)

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 – Constant deviation spectrometer – calculation of characteristic wave number of spectral lines.

UNIT – II: INTERFERENCE   (15 hours)

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: DIFFRACTION   (15 hours)

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: POLARIZATION   (15 hours)

Double refraction – Nicol prism – polarizer and analyzer – Huygens's explanation of double refraction in uniaxial crystals – Dichroism – polaroids 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: SPECTROSCOPY   (15 hours)

Infrared spectroscopy, RAMAN, NMR, ESR - Principle –Instrumentation – applications-LASER, Principles of LASER, Semiconductor LASER, Nd-Yag LASER-Applications

Text Books

1. Subramaniam N & Brijlal, *Optics,* S. Chand & Co. Pvt. Ltd., New Delhi, 1990.
2. Khanna D R & Gulati H R, *Optics,* S. Chand & Co. Pvt. Ltd., New Delhi, 1979.
3. R. Murugesan, *Optics and Spectroscopy* S. Chand & Co. Pvt. Ltd., New Delhi, 2009.
4. Kailash K. Sharma, *Optics: Principles and Applications,* Academic Press, 2006.

REFERENCE BOOKS

1. Jenkins A. Francis and White E. Harvey, *Fundamentals of Optics*, McGraw Hill Inc., New Delhi, 1976.
2. Lipson S G, Lipson H and Tannhauser D S, *Optical Physics,* Cambridge University Press, 1995.
3. Raj M G, *Fundamentals of Optics*, Anmol Publications Pvt. Ltd, New Delhi, 1996.
4. D. Halliday, R. Resnick and J. Waler, *Fundamentals of Physics*, Wiley NY 6th Edition, 2001.
5. D Halliday, Resnick and K. S. Krane, *Physics*, 4th Edition Vols I & II, Wiley, 1994.
6. R. P. Feynman, R. B. Leighton and M. Sands, *The Feynman Lectures on Physics*, Vols.I, II and III Narosa, New Delhi, 1998.
7. G.Aruldhas, *Spectroscopy*, Vendeur Book Vistas (New Delhi, India), 2009.

YEAR-III SEM- V	Course Code: 19PH510	Course Title: SOLID STATE PHYSICS	HRS/WK 5	CREDIT 5

Course Outcomes

CO1	To Learn the Fundamental of Bonds in Solids
CO2	To Study the concepts of X-ray diffraction its applications in solids
CO3	Understanding the properties of Magnetism and its applications in quantum physics
CO4	Acquiring the knowledge of Dielectrics and its properties in various materials
CO5	To Procure the knowledge of Superconductivity and its applications

Mapping of course outcomes with the program specific outcomes

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	1.1	3.5	1.2	3.3	2.2	4.4	4.3	4.1	4.5	3.6	2.4	3.14
CO2	1.2	3.8	1.3	3.3	2.1	3.9	3.7	3.7	3.9	3.7	2.2	2.98
CO3	1.6	3.8	1.2	3.1	2.3	4.8	4.1	3.8	3.8	3.9	2.5	3.17
CO4	1.2	3.4	1.6	3.6	2.5	3.9	4.2	4.6	4.3	4.6	2.2	2.95
CO5	1.4	4.0	1.1	3.7	2.2	4.0	3.9	4.2	4.5	4.3	2.1	3.21
Mean Overall Score												3.09

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$	Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

Unit I : BONDS IN SOLIDS   (15 hours)

Crystal lattice- primitive and unit cell- seven classes of crystals – Bravais lattice-Miller indices- structure of crystals- simple cubic, Hexagonal close packed structure-Face centred cubic structure, Body centered cubic structure, Simple cubic structure-Sodium chloride structure, Zinc Blende structure, Diamond structure

Unit II: X-RAY DIFFRACTION   (15 hours)

Diffraction of x-rays by crystals-Bragg's law in one dimension-Experimental method in x-ray diffraction-Laue method, Rotating crystal method-Powder photograph method-von Laue's equations-Point defects- Line defects- Surface defects- Volume defects-Effects of crystal imperfections

Unit III: MAGNETISM   (15 hours)

Different type of magnetic materials- Classical theory of Diamagnetism(Langevin theory)-Langevin theory of Paramagnetism – Weiss theory of Paramagnetism- Qualitative explanation of Heisenberg's Internal Field and Quantum Theory of Ferromagnetism.

Unit IV: DIELECTRICS   (15 hours)

Fundamentals definitions in dielectrics – different types of electric polarization-Frequency and Temperature Effects on Polarization – Dielectric loss – Local Field on internal field Clausius-Mosotti Relation- Determination of Dielectric Constant – Dielectric Breakdown – Properties of Different types of insulating materials

Unit V: SUPERCONDUCTIVITY   (15 hours)

Introduction-Meissner effect-Limitation- Type I& II Superconductivity-Vortex states- BCS Theory(Qualitative treatment only)-Josephson's effect-Copper pair tunneling.

TEXT BOOKS

1. K. Ilangovan, *Solid State Physics*, MJP Publication, 2012.
2. S.O. Pillai, *Solid State Physics,* New Age Science Publication, 2009.
3. Arumugam, *Materials Science*, Anuradha Publications, 2015.
4. Puri & Babber, *Solid State Physics,* S. Chand Limited, 2008.

REFERENCE BOOKS

1. C. Kittel, *An introduction to Solid State Physics,* 5th Edition, Published by John Wiley & Sons Inc, 1976.
2. Dekker A.J. *Solid State Physics*, Mac Millon Ind. Ltd., 1985.
3. Ascroft & Mermin, *Solid State Physics*, Pacific Grove, CA: Brooks cole, 1976.
4. Gupta and Kumar, *Solid State Physics*, K Nath & Co., 2013.

YEAR-III SEM- V	Course Code: 19EPH51A	Course Title: DIGITAL ELECTRONICS	HRS/WK 5	CREDIT 4

Course Outcomes

CO1	To Learn the Fundamental of Digital electronics & Microprocessor
CO2	To Study the functions of Boolean Algebra
CO3	Obtaining the knowledge about Arithmetic circuits & Sequential Logic circuits
CO4	To Learn about the working of D/A & A/D Converters
CO5	To Introduce the concepts and working of microprocessor 8085

Mapping of course outcomes with the program specific outcomes

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	3.5	4	3.5	3	3	3	3	2.5	3.5	3	3.5	3.23
CO2	3.5	4	4	4	4	2.5	2.5	4	4	4	4	3.68
CO3	3	3.5	3	2.5	4	4	4	3.5	3.5	4	4	3.55
CO4	3	3.5	2.5	3.5	4	3.5	4	3.5	4	3.5	3.5	3.50
CO5	4	3.5	4	3.5	3.5	4	3.5	3.5	3.5	3.5	3.5	3.64
Mean Overall Score												3.52

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT– I DIGITAL FUNDAMENTALS   (15 hours)

Number systems – decimal, binary, octal and hexadecimal systems – conversion from one number system to another Codes – BCD code – excess 3 code, Gray code – ASCII code – Binary arithmetic – Binary addition – subtraction – unsigned binary numbers – sign magnitude numbers – I's and 2's complement – Binary multiplication and division.

LOGIC GATES AND LOGIC FAMILIES   (15 hours)

AND, OR circuits using diodes and transistors – NOT using transistors – NAND, NOR and EXOR – functions and truth tables. NAND & NOR as universal gates.

UNIT – II   BOOLEAN ALGEBRA AND SIMPLIFICATION OF LOGIC CIRCUITS (15 hours)

Laws and theorems of Boolean algebra – De Morgan's theorems and their circuit implications – Duality theorem, simplification of Boolean equations – Karnaugh map – pairs, quads, octets – 2,3 and 4 variables –SOP method – NAND – NAND circuits – POS method – NOR – NOR circuits.

UNIT - III   ARITHMETIC CIRCUITS AND SEQUENTIAL LOGIC CIRCUITS   (15 hours)

Arithmetic building blocks – Half adder – Full adder – parallel binary adder – Half subtractor – Full subtractor – The adder- subtractor – digital comparator – parity checker/generator. Flip-flops –JK flip – flop – JK master slave flip-flop – Flip flop applications. Shift register functions- Shift right-shift left-Shift register applications.

UNIT – IV: D/A AND A/D CONVERTERS   (15 hours)

Introduction – variable resistor network – binary ladder – D/A converter – D/A accuracy and resolution – A/D converter – simultaneous conversion – A/D accuracy and resolution.

UNIT – V: INTRODUCTION TO MICROPROCESSOR 8085   (15 hours)

Basics of semiconductor memory- RAM, ROM, PROM and EPROM. Microcomputer organization-8085 Microprocessor-pin functions-architecture-machine and assembly language-programmer's model of 8085-8085 addressing modes. Classification of instruction and format – 8-bit data transfer and arithmetic instructions.

TEXT BOOKS

1. Arul Thalapapathi, *Fundamentals of Digital Computers*, Comptek Publishers, Chennai, 1995.
2. Vijayendran, *Fundamentals of Microprocessor 8085*, S. Viswanathan Pvt.Ltd, 2006.
3. Vijayendiran, *Integrated Electronics*, Viswanathan, S., Printers & Publishers Pvt. Ltd., 2009.
4. Nagoor Kani, *Microprocessor,* RBA Publications, 2016.
5. B. Ram, *Introduction to Microprocessor and Microcontroller,* Dhanpat Rai Publications, 2012.

REFERENCE BOOKS

1. Malvino and Leech, *Digital Principles and Application*, 4th Edition, Tata Mcgraw Hill, New Delhi, 2000.
2. Millman and Halkias, *Integrated Electronics*, International Edition, McGraw Hill, New Delhi, 1972.
3. T. C. Bartee, *Computer Architecture and Logic Design*, McGraw Hill, 1991.
4. J.P. Agarwal and Anit Agarwal, *Solid State Electronics*, Pragati Prakashan, 2nd Edition, 2014.
5. Herbert Taub and Donald Schilling, *Digital Integrated Electronics*, McGraw Hill, 1st Edition, 2008.
6. Anokh Singh and A. K. Chhabra, *Fundamentals of Digital Electronics and Microprocessors,* 2nd Revised and Enlarged Ed., 2. Chand & Co. Ltd., New Delhi, 2005.
7. Floyd, *Digital Fundamentals,* Pearson Education, 8th Edition, S. Chand Publications, 2004.

YEAR-III SEM-V	Course Code: 19EPH51B	Course Title: NUMERICAL METHODS & BASIC COMPUTER PROGRAMMING ELECTIVE-IB	HRS/WK 4	CREDIT 3

Course Outcomes

CO1	To Learn the Solve various Fundamental mathematical equations
CO2	To Study the functions of Interpolation methods
CO3	Acquring the knowledge about Numerical integration & Differentiation
CO4	To Learn the Basic of C Language
CO5	To Procure the concepts of Control Statements in C Language

Mapping of course outcomes with the program specific outcomes

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	1.1	3.8	1.1	3.4	3.5	3.4	4.3	4.6	3.2	3.3	2.1	3.07
CO2	2.2	3.6	1.1	3.5	2.8	3.6	4.4	4.2	3.5	3.5	1.1	3.04
CO3	2.1	3.7	1.1	3.1	3.3	3.3	4.1	4.8	3.3	3.6	1.1	3.04
CO4	3.4	4.4	1.0	4.6	3.5	4.2	4.1	3.3	2.1	3.8	2.2	3.32
CO5	3.6	4.0	1.0	4.7	3.6	4.0	4.3	4.5	2.0	4.4	2.1	3.47
Mean Overall Score												2.926

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT 1: SOLUTION OF EQUATION **(15 hours)**

Eigen values, Eigen vectors, Cayley Hamilton; characteristic equation of a matrix –Solution of simultaneous equations – Gauss elimination method – Gauss-Jordan method.

UNIT 2: INTERPOLATION **(15 hours)**

Linear and Lagrange interpolation – Newton's forward & backward interpolation polynomial equation & determination of roots – Newton-Raphson method.

UNIT 3: NUMERICAL INTEGRATION AND DIFFERENTIATION **(15 hours)**

Trapezoidal rule – Simpson rule 1/3 & 3/8 – Solution of first & second order differential equation: Taylor series – Euler's method (Improved & Modified) – Solutions of forth order Runge-Kutta method.

UNIT 4: DATA TYPE OPERATORS **(15 hours)**

History & Features of C Language - Variable name – data type and sizes – declaration – arithmetic, relational and logical operators – perecedence and order of evaluation.

UNIT 5: CONTROL STATEMENTS **(15 hours)**

Unconditional control statements – GOTO and labels – Conditional control statements – simple IF, IF..ELSE, nested IF..ELSE, ELSE IF ladder – switch case – break – continue statement. Looping statement – while – do..while – for – nested for loop – (**Basic Programs - Qualitative studies only**)

TEXT BOOKS

1. S.S. Sastry, *Numerical Methods*, Prentice Hall India Learning Private Limited; Fifth edition 2012.
2. Venkataraman, *Numerical Methods*, The National Publishing Company, Madras, 1999.
3. Thilagavathi, *Numerical Methods*, Published by S. Chand & Company Ltd., 2013.
4. Kandasamy, *Numerical Methods*, S Chand & Company; Reprint 6th Edition, 2006.
5. E. Balagurusamy, *ANSI-C*, McGraw Hill Education India Private Limited; Seventh Edition, 2016.

REFERENCE BOOKS

1. Satya Prakash, *Mathematical Physics*, 4th Ed., Sultan Chand & Sons Publication, New Delhi, 2014.
2. A. Singaravelu, Numerical methods, 1st Ed., Meenakshi Publication, Tamil Nadu, 2008.
3. Yeshwant kanitkar, *Let us 'C'*, BPB Publications; Thirteenth Revised and Updated Edition, 2016.
4. Kuo-Addison, *Numerical Methods and Computers*, Wesely London, 1966.

YEAR-III SEM- V	Course Code: 19EPH52A	Course Title: GEOPHYSICS ELECTIVE-2C	HRS/WK 5	CREDIT 3

Course Outcomes

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 Sesimology
CO5	To Learn the basics of Geodynamics

Mapping of course outcomes with the program specific outcomes

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 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= $\dfrac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$

Mean Overall Score of COs= $\dfrac{Total\,MeanScores}{Total\,No.of\,COs}$

UNIT 1: THE EARTH IN THE SOLAR SYSTEM **(15 Hours)**

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 2: **THE EARTH'S GRAVITATIONAL FIELD** **(15 Hours)**

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 3: THE MAGNETIC FIELD OF THE EARTH **(15 Hours)**

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 4 : SEISMOLOGY **(15 Hours)**

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 5: GEODYNAMICS **(15 Hours)**

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,

3. Stacey, F. D. Physics of the Earth. 3rd ed. Brisbane, Australia: Brookfield Press, 1992.
4. Sleep, Norman H., Kazuya Fujita, and K. Fujita. Principles of Geophysics. Malden, MA: Blackwell Science, 1997

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.
3. Anderson, Don. Theory of the Earth. Malden, MA: Blackwell Science, 1990.
4. Merrill, Ronald T., et al. The Magnetic Field of the Earth. Burlington, MA: Academic Press, September 15, 1998.

YEAR-III SEM- V	Course Code: 19EPH52B	Course Title: FIBER OPTIC COMMUNICATION ELECTIVE- 2D		HRS/WK 5	CREDIT 3

Course Outcomes

CO1	To understand the basics of optic fibers
CO2	To study the information about the characteristics of fiber optics
CO3	To Obtain the knowledge about the Communication processes
CO4	To study the functions of couplers and connectors
CO5	Procuring the functions of Analog and Digital Links

Mapping of course outcomes with the program specific outcomes

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	1.1	3.5	1.2	3.3	2.2	4.4	4.3	4.1	4.5	3.6	2.4	3.14
CO2	1.2	3.8	1.3	3.3	2.1	3.9	3.7	3.7	3.9	3.7	2.2	2.98
CO3	1.6	3.8	1.2	3.1	2.3	4.8	4.1	3.8	3.8	3.9	2.5	3.17
CO4	1.2	3.4	1.6	3.6	2.5	3.9	4.2	4.6	4.3	4.6	2.2	2.95
CO5	1.4	4.0	1.1	3.7	2.2	4.0	3.9	4.2	4.5	4.3	2.1	3.21
Mean Overall Score												3.09

Result: The Score for this course is 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= $\dfrac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\dfrac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT - I: OPTIC FIBERS (15 hours)

Fiber optic revolution – basic characteristics of optical fiber – acceptance angle – numerical aperture – propagation of light through optical fiber – theory of mode formation – classification of fibers – step index and graded index fibers – single mode and multi mode fibers –

UNIT - II: TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS (15 hours)

Introduction, Attenuation, absorption, scattering losses, bending loss, dispersion, Intra model dispersion, Inter model dispersion.

UNIT - III: FIBER OPTIC COMMUNICATION (15 hours)

Source and detectors for fiber optic communication – Laser and LED – Analog and digital modulation methods – principle of optical detection – pin and APD photo detectors – Noise – Design consideration of a fiber optic communication system.

UNIT – IV: FIBER COUPLERS AND CONNECTORS (15 hours)

Introduction, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers.

UNIT - V : ANALOG AND DIGITAL LINKS (15 hours)

Analog links – Introduction, overview of analog links, CNR, multichannel transmission techniques, RF over fiber, key link parameters, Radio over fiber links, microwave photonics. Digital links – Introduction, point–to–point links, System considerations, link power budget, resistive budget, short wave length band and transmission distance for single mode fibers, Power penalties, nodal noise and chirping.

TEXT BOOKS

1. R. Murugeshan, *Modern Physics*, S. Chand & Co., 2009.
2. Senthil Kumar, *Engineering Physics*, VRB Publishers Pvt. Ltd., 2013.
3. Senior, Optical Fiber Communications: Principles and Practice, 3e: Third edition, Pearson, 2010
4. Sarkar Subir Kumar, Optical Fibres and Fibre Optic Communication Systems S. Chand, 2010

REFERENCE BOOKS

1. John M. Senior, *Optical Fiber Communications,* Cambridge University Press, 1996.

2. Govind P. Agrawal, *Fiber – Optic Communication Systems*, John- Willey & Sons, 2007.
3. P. K. Palanisamy, *Physics for Engineering*, Scitech publishing Pvt. Ltd., Chennai, 2009.

YEAR- III SEM- V	Course Code: **19SPH51**	Course Title: **ELECTRICAL WIRING** **ELECTIVE- 2D**	HRS/WK 5	CREDIT 4

Course Outcomes

CO1	To Understand different methods of electricity generation and types of motors.
CO2	To Study the electrical components, symbols, types of circuits and tools
CO3	To Study the various methods of joining conductors and electrical accessories
CO4	To Learn the methods of wiring a house and industry
CO5	To Hands on training on house wiring and troubleshooting the electrical circuits and appliances

Mapping of course outcomes with the program specific outcomes

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	3.5	2.2	3.3	3.5	3.6	4.3	3.6	4.2	4.3	1.1	3.24
CO2	3.2	3.8	2.3	3.5	2.8	3.4	4.4	3.2	4.6	4.7	1.2	3.43
CO3	1.1	3.6	1.2	3.1	3.3	3.8	4.1	3.8	4.4	4.4	1.5	3.11
CO4	4.0	3.4	1.4	2.6	3.5	3.8	4.6	3.3	4.3	4.1	1.2	3.29
CO5	2.4	4.0	1.3	3.7	3.6	4.0	4.4	4.3	4.3	4.0	1.1	3.37
Mean Overall Score												3.304

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,MeanScores}{Total\,No.of\,COs}$

Unit-I:ELECTRICITY GENERATION **(12 Hours)**

Fundamentals of electricity - Current, Voltage, resistance - Ohm's law - Power - Kilowatt hour - Watt meter - Electrical measurements - Electric power generation by Thermal, hydro, atomic and nuclear methods - Batteries - Generators - Study of Generator.

Unit-II:ELECTRIC CIRCUITS AND DISTRIBUTION **(12 Hours)**

Symbols of electrical parameters - Importance Series, Parallel connections -Ac and DC - Conductors - Inductor, Conductors -Inductor, Capacitor and transformer - Distribution methods - single phase and three phase - Star and delta connections - Rules of electric connections - SWG -Motors - Study of motor, series and parallel circuits.

Unit-III:ELECTRICAL WIRING -I **(12 Hours)**

Tools - Methods of Joining conductors - House wiring methods - Gilt, wood casing, Tough - Rubber sheathed, conduit or PVC pipe and concealed – Switches - ceiling roze - lamp holders, sockets - Fuse base - Distribution box– Trip switches - Earth connection -Experimental study of house wiring.

Unit-IV :ELECTRICAL WIRING - II **(12 Hours)**

Main board preparation - Distribution - Cut - out preparation - Switch board preparation - Power factor -IEE regulations - Safety precautions –Testing the insulation -Experimental study of main, distribution and switch boards.

Unit-V:ELECTRICAL APPLIANCES **(12 Hours)**

Tungsten - filament bulb - tube light -mercury and sodium vapour lamp -LED lamp - heater - iron box - table fan - ceiling fan - battery eliminator -electrical requirement to washing machine and refrigerator - procedure to rectify the electrical faults in electrical appliances.

Textbook:

Course material prepared by the Department.

YEAR- III		PHP505
SEMESTER V	PRACTICAL -V	HRS/WK-6
PRACTICAL -5		CREDIT-3

(Any Twelve of the Following)
1. Youngs modulus – Koenig's method – non uniform bending
2. Newtons rings – R1, R2 and µ of a convex lens
3. Spectrometer i – i' curve
4. Spectrometer – narrow angled prism – µ of the prism.
5. Spectrometer – Cauchy's constant
6. Construction of voltage regulator (2 Diodes)-Zener Diode
7. RC coupled single stage amplifier
8. Construction of a low range power pack- Two diodes
9. EMF of a thermocouple – mirror galvanometer (or) table galvanometer
10. Potentiometer – emf of a thermocouple.
11. BG comparison of EMFs
12. Potentiometer - Conversion of galvanometer into voltmeter
13. BG – Absolute Capacitance
14. BG – comparison of capacitances BG – absolute capacitance of a capacitor
15. BG – comparison of Mutual Inductance.
16. Transistor characteristics – CE mode.

YEAR-III SEM- VI	Course Code: 19PH611	Course Title: RELATIVITY, QUANTUM MECHANICS AND MATHEMATICAL METHODS		HRS/WK 5	CREDIT 5

Course Outcomes

CO1	To understand the concept of Relativity
CO2	To Learn the principles & properties of waves and matter
CO3	To know about the Schrodinger equations and its applications
CO4	To study the mathematical functions in physics
CO5	To Gain the knowledge about the special functions

Mapping of course outcomes with the program specific outcomes

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	2.8	4.1	3.5	3	2.8	3.5	3.1	4	3.4	3.2	3.32
CO2	3.5	3.2	3	3	3.5	3.6	4	3.6	3	2.6	3.5	3.31
CO3	3.5	4.2	3.2	2.8	3	3.2	3	3.5	3.7	3.5	3.2	3.34
CO4	3.2	3.6	3	4	3	3.5	3.5	2.8	3.5	3.1	3.6	3.34
CO5	4.1	3.5	3.7	3.2	3.5	2.5	3.5	3	4.1	3.2	3.5	3.43
Mean Overall Score												3.34

Result: The Score for this course is 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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$ Mean Overall Score of COs= $\frac{Total\ Mean Scores}{Total\ No.of\ COs}$

UNIT - I : RELATIVITY   **(15 hours)**

Frames of references – Michelson – Morley experiment – significance of negative result – postulates of special theory of relativity – Lorentz transformation equations – Length contraction – Time dilation – Relativity of simultaneity – Law of addition of velocities – variation of mass with velocity – relativistic kinetic energy equations – postulates of general theory of relativity – gravitational red shift.

UNIT - II WAVE MECHANICS   **(15 hours)**

Matter Waves – de Brogile wavelength – wave velocity and group velocity – Heisenberg's Uncertainty principle – proof of Uncertainty principle for one dimensional wave packet – postulates of wave mechanics – properties of wave function – operator formalism (Basics only)– eigen functions – eigen values – expectation values.

UNIT - III : SCHRöDINGER EQUATIONS AND ITS APPLICATIONS (15 hours)

Schrödinger equation – time dependent and time independent – application of Schrödinger equations – linear harmonic oscillator – zero point energy – particle in a one dimensional box – barrier penetration and tunneling effect rigid rotator – hydrogen atom.

UNIT - IV : MATHEMATICAL PHYSICS   **(15 hours)**

Gauss divergence theorem – stokes theorem – Greens theorem – applications of vectors to hydrodynamics.
Spherical polar coordinates – expressions for gradient, div in Cartesian & spherical coordinates.

UNIT - V : SPECIAL FUNCTIONS   **(15 hours)**

Beta and gamma functions– relation between them – harmonics-Bessel's differential equations – Legendre's differential equations – Hermite's differential equations – Laguerre's differential equations – series solutions.

TEXT BOOKS

1. V. Devanathan, *Quantum Mechanics*, Narosa, Chennai, 2005.
2. R. Murugeshan, Kiruthigs, Sivaprasath, *Modern Physics,* S Chand & Co., 2007.
3. V. K. Thangappan, *Quantum Mechanics*, Wiley Eastern, 1985.
4. P. M. Mathews and Venkatesan, *A Text Book of Quantum Mechanics,* McGraw Hill, 1978.
5. Sathya Prakash, *Mathematical Physics,* Sultan Chand & Sons, 6th Revised Edition Reprint 2014*.*
6. R. Murugeshan, *Mechanics and Mathematical Methods,* S Chand Publishing & Co., 2015.

REFERENCE BOOKS

1. B. D. Gupta, *Mathematical Physics,* Vikas Publishing House; Fourth Edition, 2009.
2. Ghatak and Loganathan, *Quantum Mechanics*, McMillan, 2004.
3. A. Ghatak, *Basic Quantum Mechanics*, McMillan India, 2002.
4. Murray Spiegal, *Introduction to Boundary Value Problems* (Scahaum's Series), McGraw-Hill Education; 1st Edition, 1974.

YEAR-III SEM- VI	Course Code: 19PH612	Course Title: NUCLEAR &RADIATION PHYSICS	HRS/WK 5	CREDIT 5

Course Outcomes

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

Mapping of course outcomes with the program specific outcomes

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 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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$

Mean Overall Score of COs= $\frac{Total\ MeanScores}{Total\ No.of\ COs}$

UNIT - 1 : NUCLEAR STRUCTURE   **(15 hours)**

Nuclear spin – determination of magnetic dipole moment, electric quadruple moment, parity of nuclei, isospin, theories of nuclear composition, proton and electron 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 : RADIOACTIVE DECAY   **(15 hours)**

Radioactive disintegration – law of successive disintegration – transport and secular equilibrium – radioactive series – Geiger – Nuttal 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 : PARTICLE ACCELERATORS AND DETECTORS   **(15 hours)**

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

UNIT - IV : REACTORS AND RADIATION PHYSICS   **(15 hours)**

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 rectors.

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 : ELEMENTARY PARTICLES   **(15 hours)**

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, *Modern Physics*, S. Chand & Co., 2009.
4. R. Murugeshan & Kiruthiga, Sivaprasath, *Modern Physics*, S. Chand & Co., 2009.
5. Thayalan, *Basic Radiological Physics*, Jaypee Brothers Medical Publishers Pvt. Ltd, 1st Edition, 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*, Kedar Nath & Ram Nath Publishers, 2000.
3. Irving Kaplan, *Nuclear Physics*, Narosa, 2002.
4. Nuclear Physics – J B Rajam, S chand Publishing Co.
5. Littlefield & Thorley, *Atomic and Nuclear Physics*, Springer, 3rd Ed. 1979.

YEAR-III SEM-VI	Course Code: 19EPH63A	Course Title: ASTROPHYSICS	HRS/WK 5	CREDIT 4

Course Outcomes

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

Mapping of course outcomes with the program specific outcomes

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 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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$ Mean Overall Score of COs= $\frac{Total\ Mean Scores}{Total\ No.of\ COs}$

UNIT I: ASTRONOMY **(15 Hours)**

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

UNIT II: ASTRONOMICAL INSTRUMENTATION **(15 Hours)**

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

UNIT III: STARS **(15 Hours)**

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 : STELLAR STRUCTURE **(15 Hours)**

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: STELLAR EVOLUTION **(15 Hours)**

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. WM Smart and R M Greene, Textbook on Spherical Astronomy, Cambridge University Press (1986)Sixth Edition.
4. Frank Shu, The Physical Universe, University of California (1982).
5. Roy A E and Clarke D, Astronomy principles and Practice, Institute of Physics (2003) Fourth Edition.
6. 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. Clayton D D, Principles of Stellar Evolution and Nucleosynthesis, University of Chicago Press(1983).
3. Kippenhahn and Weigert, Stellar Structure and Evolution, Springer (1990).
4. Binney, J. and Tremaine S., Galactic, Dynamics, Princeton University Press (1994).
5. Binney J, and Merrifield, Galactic Astronomy, Princeton University Press (1998).
6. K.D. Abhyankar, Astrophysics (Stars and Galaxies), Tata McGraw Hill (1992).
7. Baidyanath Basu, An Introduction to Astrophysics, Prentice Hall of India (2003).
8. Jayant V Narlikar, An Introduction to Cosmology, Cambridge University Press (2004).

YEAR-III SEM-VI	Course Code: 19EPH63B	Course Title: ENERGY PHYSICS	HRS/WK 5	CREDIT 4

Course Outcomes

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

Mapping of course outcomes with the program specific outcomes

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	2.5	4.1	3.5	3	2.5	3	3.1	4	3.2	3.2	3.19
CO2	3.3	3.2	3	3	3.5	2.8	4	3.6	3	2.3	3.5	3.2
CO3	3.5	4.2	3.5	2.8	3	3.2	3.5	3.5	3.7	4	3.2	3.46
CO4	3.2	3.8	3	4.2	3	3.5	3.5	2.8	3.6	3.5	3.6	3.42
CO5	4.3	3.5	3.7	3.2	3.8	2.5	3.5	3.2	4.3	3.2	3.5	3.51
Mean Overall Score												3.36

Result: The Score for this course is 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= $\frac{Total\,Values}{Total\,No.of\,POs\,\&\,PSOs}$ Mean Overall Score of COs= $\frac{Total\,Mean\,Scores}{Total\,No.of\,COs}$

UNIT I (15 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 (15 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 (15 hours)

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 (15 hours)

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

UNIT V (15 hours)

Energy storage and impacts of Non-conventional energy: Conversion of energy- patterns of energy consumption in domestic, industrial, transpotation, 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.

YEAR- III		PHP606
SEMESTER - VI	**PRACTICAL -VI**	**HRS/WK-6**
PRACTICAL - 6		CREDIT-3

(Any Twelve out of Sixteen can be selected)

1. Construction of a full wave rectifier-solid state using four diodes
2. 5V – Ic regulated power supply – characteristics
3. RC-coupled amplifier using transistor- Double statge(voltage gain and variation with load)
4. Hartley oscillator
5. Colpitt's oscillator
6. NAND, NOR universal gates
7. Half adder and Full adder – mixture of gates
8. Half subtractor and Full subtractor- mixture of gates
9. Multiplexer and demultiplexer
10. Microprocessor programming – 8-bit Addition and Subtraction.
11. Microprocessor programming – 8-bit Multiplication and Division.
12. RS, D-flip flop, Clocked RS Flip flop using NAND gates only
13. Four bit ripple counter
14. Verification of De Morgan's theorem.
15. Basic logic gates using transistor –AND, OR & NOT gates.
16. OP AMP inverting-Non inverting-Summing-Difference amplifier-Voltage follower-Averager

YEAR-III SEM- VI	Course Code: 19SPH61	Course Title: COMPUTER LITERACY	HRS/WK 4	CREDIT 2

Course Outcomes

CO1	To impart basic level appreciation programme for the common man.
CO2	To use the computer for basic purposes of preparing his personnel/business
CO3	To helps the small business communities, to maintain their small account
CO4	Know to the making small presentations
CO5	Introduction to origin software & adobe photoshop

Mapping of course outcomes with the program specific outcomes

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	2.5	4.1	3.5	3	2.5	3	3.1	4	3.2	3.2	3.19
CO2	3.3	3.2	3	3	3.5	2.8	4	3.6	3	2.3	3.5	3.2
CO3	3.5	4.2	3.5	2.8	3	3.2	3.5	3.5	3.7	4	3.2	3.46
CO4	3.2	3.8	3	4.2	3	3.5	3.5	2.8	3.6	3.5	3.6	3.42
CO5	4.3	3.5	3.7	3.2	3.8	2.5	3.5	3.2	4.3	3.2	3.5	3.51
Mean Overall Score												3.36

Result: The Score for this course is 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= $\frac{Total\ Values}{Total\ No.of\ POs\ \&\ PSOs}$	Mean Overall Score of COs= $\frac{Total\ Mean Scores}{Total\ No.of\ COs}$

UNIT-I: COMPUTER , COMMUNICATIONS AND COLLABORATION (12 Hours)

Introduction - Components of Computer System -Concept of Hardware and Software -Application Software-Systems software-Concept of computing, data and information- Applications of IECT - e-governance - Connecting keyboard, mouse, monitor and printer to CPU - Checking power supply-Operating system -The User Interface -Task Bar-Icons-Menu-Running an Application. Introduction- Basics of E-mail- Using E-mails -Opening Email account-Mailbox: Inbox and Outbox -Creating and sending a new E-mail - Replying to an E-mail message -Forwarding an E-mail message -Sorting and Searching emails-document collaboration -Netiquettes

UNIT-II: UNDERSTANDING WORD PROCESSING   (12 Hours)

Introduction-Opening Word Processing Package -Menu Bar-Using The Help - Using The Icons Below Menu Bar-Opening and closing Documents -   Opening Documents- Save and Save as -Page Setup -Print Preview -Printing of documents -Text Creation and manipulation -Document Creation -Editing Text - Text Selection -Cut, Copy and Paste -Spell check-Thesaurus -Formatting the Text- Font and Size selection -Alignment of Text - Paragraph Indenting -Bullets and Numbering -Changing case -Table Manipulation -Draw Table -Changing cell width and height -Alignment of Text in cell -Delete / Insertion of row and column -Border and shading

UNIT-III: USING SPREAD SHEET   (12 Hours)

 Introduction -Elements of Electronic Spread Sheet-Opening of Spread Sheet-Addressing of Cells-Printing of Spread Sheet-Saving Workbooks-Manipulation of Cells -Entering Text, Numbers and Dates -Creating Text, Number and Date Series- Editing Worksheet Data-Inserting and Deleting Rows, Column -Changing Cell Height and Width-Formulas and Function-Using Formulas-Function

UNIT-IV: MAKING SMALL PRESENTATIONS   (12 Hours)

Introduction - Using PowerPoint -Opening A PowerPoint Presentation- Saving A Presentation -Creation of Presentation-Creating a Presentation Using a Template-Creating a Blank Presentation-Entering and Editing Text-Inserting And Deleting Slides in a Presentation-Preparation of Slides-Inserting Word Table or An Excel Worksheet-Adding Clip Art Pictures-Inserting Other Objects-Resizing and Scaling an Object -Presentation of Slides-Viewing A Presentation-Choosing a Set Up for Presentation-Printing Slides And Handouts-Slide Show - Running a Slide Show-Transition and Slide Timings - Automating a Slide Show

UNIT-V: ORIGIN SOFTWARE &   ADOBE PHOTOSHOP   (12 Hours)

Origin 8-Data analysis and Graphing workspace-Workbook-Worksheet& Worksheets column-Importing and Exporting data-Graphing: Customizing and Formatting the graph-Fitting analysis

Introduction to Adobe photoshop, creating and saving a document in photoshop, page layout and back ground ,ruler, paletts, tool box, ,saving files, reverting files, closing files. image size and resolution ,image editing, colour modes and adjustments , Zooming & Panning an Image,, , Rulers, Guides & Grids- Cropping & Straightening an Image,image backgrounds , working with pen tool, save and load selection-working with erasers-working with text and brushes-Colour manipulations: colour modes- Levels – Curves- Seeing Colour accurately - Patch tool – Cropping-Reading your palettes - Dust and scratches-Advanced Retouching- smoothing skin Layers: Working with layers- layer styles- opacity-adjustment layers

REFERENCE BOOKS:

1. Fundamentals of Computers by Reema Thareja from Oxford University Press
2. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color Grading & Graphic...19 February 2016 by David Maxwell

THEORY EXAMINATION

Question Paper Pattern
Continuous internal assessment (CIA) (25 marks)

Two internal Examinations   15 marks
Assignment / Seminar   10 marks

Total   **25 marks**

External Examination (75 marks)

Question Pattern – UG

Time: 3 Hours   **Max. Marks: 75**

Section – A (10 X 2 = 20)
(Answer ALL the questions)
(Two questions from each Unit)

Section – B (5 X 5 = 25)
(Answer all the questions)
(One question from each Unit; either or pattern and any one of the questions will be a problem; both part)

Section C (3 X 10 = 30)
(Answer any Three Questions out of five)
(One Question from each unit and it may have subdivisions may contain problems also)

PRACTICAL EXAMINATION

Continuous internal assessment (CIA) (40 marks)
Based on the periodical evaluation of record and experiments assessed by the staff in charge

External Examination (60 marks)
3 Hrs. Exam
Total Marks: 60

1. Experiment	50 Marks
2. Record	10 Marks

$ Skill Development Courses
Fully Internal
Theory   -40 marks
Practical   -60 marks