ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

CUDDALORE-1

PG & RESEARCH DEPARTMENT OF PHYSICS

B.Sc (Physics)

SYLLABUS 2018-2019

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

First Year

Semester	Part	Subject Code	Subject Title	Hours	Credits
I	**I**	LT101S	Tamil – I / Hindi – I / French - I	4	3
	II	LE101S	English-I	4	3
	III	PH101	Properties of Matter & Acoustics	8	6
	III	PHP01	Main Practical-I	3	2
	III	AMT101S	Allied- Mathematics-I	8	6
	IV	ECL101	Skill Based Courses	3	2
	Total			**30**	**22**
	Grand Total Credits				**22**
II	**I**	LT202	Tamil – II / Hindi – II / French – II	4	3
	II	LE202	English-II	4	3
	III	PH202	Thermal and Statistical Physics	8	6
	III	PHP02	Main Practical-II	3	2
	III	AMT202	Allied- Mathematics-II	8	6
	IV	EPD201	Skill Based Courses	3	2
	Total			**30**	**22**
	Grand Total Credits				**22**

Second Year

Semester	Part	Subject Code	Subject Title	Hours	Credits
III	**I**	LT303	Tamil – III / Hindi – III / French –III	4	3
	II	LE303	English-III	4	3
	III	PH303T	Basics of Newtonian and Classical Mechanics	8	6
	III	PHP03	Main Practical-III	3	2
	III	ACH301	Allied- Chemistry	5	4
	III	ACHP01	Chemistry Practical	3	2
	IV	APCM301	Skill Based Courses	3	2
	Total			**30**	**22**
	Grand Total Credits				**22**

IV	**I**	LT401	Tamil – IV / Hindi – IV / French – IV	4	3
	II	LE402	English-IV	4	3
	III	PH404	Electricity & Magnetism	8	6
	III	PHP04	Main Practical-IV	3	2
	III	IBC401	Inter Disciplinary Course (IDC)*	5	4
	III		Practical (IDC)*	3	2
	IV	EVS401	Skill Based Courses	3	2
	Total			**30**	**22**
	Grand Total Credits				**22**

***IDC: Students should select any one paper offered by other than Physics Department**
(IDC)* = Bio Physics Elective Subject (Department of Bio-Chemistry)

Third Year

Semester	Part	Subject Code	Subject Title	Hours	Credits
V	**III**	PH505	Optics & Spectroscopy	5	4
	III	PH506S	Atomic Physics	5	4
	III	PH507	Solid State Physics	5	4
	III	PH508	Basic Electronics	5	4
	III	EPH509	Digital electronics and microprocessor (Elective V)	4	4
		EPH510	Materials science(Elective V)	4	4
	III	PHP05	Main practical-V	6	4
	Total			**30**	**24**
	Grand Total Credits				**24**
VI	**III**	PH610	Relativity, Quantum Mechanics & Mathematical Methods	5	4
	III	PH611	Nuclear & Radiation Physics	5	4
	III	PH612S	Laser & Fibre Optic Communication	5	4
	III	PH613	Applied Electronics	5	4
	III	EPH614S	Numerical methods & basic computer programming (Elective VI)	4	3
	III	EPH613	Energy Physics(Elective VI)	5	3
	III	PHP06	Main Practical –VI	6	4
	Total			**30**	**23**
	IV	JPH601	Electronics Project		**3**
	IV	Extra-Curricular Activities			**2**
	Grand Total Credits				**28**

THIRD YEAR

SEMESTER-V (ELECTIVE-I)

A. DIGITAL ELECTRONICS
B. MATERIAL SCIENCE

SEMESTER – VI (ELECTIVE-II)

A. NUMERICAL METHODS & COMPUTER PROGRAMMING
B. ENERGY PHYSICS

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

Course Outcomes	
CO1	To study the basics of elasticity and its importance in beams
CO2	Understand the bending of beams
CO3	Understand the basics of Surface Tension and its applications
CO4	Understand the waves and oscillations during propagation
CO5	To study the production of Ultrasonics & acoustics of building

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: ELASTICITY-I (24 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 and twisting a wire – 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- II: BENDING OF BEAMS (24 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- III: FLUIDS (24 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 – Jaegar's method

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

UNIT-IV: WAVES AND OSCILLATIONS (24 Hours)

Transverse and longitudinal waves – Equation of wave motion – Plane Progressive wave – velocity of transverse wave on a string - Superposition of waves – Interference, reflection and transmission of waves – Resonance - intensity and loudness of sound - sound level – Decibel –Beats - stationary waves – organ pipes – Doppler effect.

UNIT-V: ULTRASONICS & ACOUSTICS (24 Hours)

Ultrasonic - Piezo electric effect - Piezo electric crystal generator – Magnetostriction effect – Magnetostriction generator – Applications – Acoustics of buildings – Reverberation and time of reverberation & measurement – Sabine's formula – Absorption co-efficient – Acoustic aspects of halls and auditorium.

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

REFERENCE BOOKS:-

1. Baldevraj., *Science & Technology of Ultrasonic*, Narosa, 2006.
2. Bajaj N.K., *Physics of Waves & Oscillations*,Tata McGraw Hill, 1988.
3. C.L. Arora, P.S. Hemine., *Physics for Degree students*. *First B.Sc Physics*, 2010.

YEAR – I	PRACTICAL – I	PHP101
SEMESTER - 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: PH202T	Course Title: THERMAL AND STATISTICAL PHYSICS	HRS/WK 8	CREDIT 6

Course Outcomes	
CO1	To acquire knowledge of transmission of heat and the laws associated with them
CO2	To understand 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 understand the concepts of statistical thermodynamics 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	4.5	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: TRANSMISSION OF HEAT (24 Hours)

Thermal conductivity – good & bad conductors – Forbe's method - Lee's disc method– relationship between thermal and electrical conductivities - Wiedemann Franz's law - Radiation- Prevost's theory of heat exchanges - law of cooling – Black body radiation - Kirchhoff's law - Wien's laws of energy distribution in black body radiation - Wien's displacement law- Rayleigh-Jean's law -Plank's law – pyrometry - solar constant – sources of solar energy & applications.

UNIT- II: KINETIC THEORY (24 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 AND LOW TEMPERATURE PHYSICS (24 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 and 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- IV: THERMODYNAMICS (24 Hours)

Intensive and extensive variables – I & II laws of 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- V: STATISTICAL THERMODYNAMICS (24 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 - Phase space – microstates and macrostates.

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	PRACTICAL - II	PHP202
SEMESTER - 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: PH303T	Course Title: BASICS OF NEWTONIAN &CLASSICAL MECHANICS	HRS/WK 8	CREDIT 6

Course Outcomes	
CO1	To make the students to understand the gravity in the various shapes
CO2	To understand concepts of projectiles and friction
CO3	To study the concepts space science
CO4	Get the knowledge of Rockets and satellites
CO5	To acquire knowledge of classical physics

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 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 **(24 hours)**

Statics: Centre of gravity- Centre of gravity of a solid and hollow cone- Solid and hollow hemisphere-Thrust-Centre of pressure- Vertical rectangular lamina.

Hydrostatics: Law of floatation- Metacenter- Metacentric height of a ship. **Hydrodynamics**: Equation of continuity of flow- Energy of the fluid- Euler's Equation of unidirectional flow -Bernoulli's theorem.

UNIT-II **(24 hours)**

Dynamics: 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 **(24 hours)**

Projectile: 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

Friction: Laws of friction- Sliding friction - Angle of friction- Cone of friction- acceleration down an inclined plane- Rolling friction and stability.

UNIT IV **(24 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 shutter- Orbital velocity- Launching of satellites - Types of satellite Orbits.

UNIT-V **(24 hours)**

Classical Mechanics: 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-Compound pendulum - Atwood's machine.

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.

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.
5. Brijlal and Subramaniyam, *Mechanics and Electrodynamics*, S. Chand, Kindle Edition, 2005.
6. Bhatia V.B., Classical Mechanics, Tamil Nadu Book House, 1997.

YEAR – II	Practical - III	PHP303
SEMESTER – III		HRS/WK - 3
CORE – PRACTICAL – III		CREDIT - 2

(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-III SEM- III	Course Code: APH301	Course Title: ALLIED PHYSICS	HRS/WK 5	CREDIT 3

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	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 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: 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	ALLIED PRACTICAL	APHP301
SEMESTER – III		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: PH404Q	Course Title: ELECTRICITY AND MAGNETISM	HRS/WK 8	CREDIT 6

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	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 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 (24 hours)

Coloumb'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- electric dipole – potential and intensity due to a dipole – 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 (24 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 (24 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 (24 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-energy stored in a magnetic field-time varying magnetic field-Single phase induction motor

UNIT V MAGNETIC PROPERTIES OF MATERIALS (24 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 – II	PRACTICAL – IV	PHP404
SEMESTER – 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-III SEM- IV	Course Code: APH401	Course Title: ALLIED PHYSICS	HRS/WK 5	CREDIT 3
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	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 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: 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	ALLIED PRACTICAL	APHP401
SEMESTER – IV		HRS/WK - 3
ALLIED		CREDIT - 2

LIST OF PRACTICALS

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

13. Determination of Young's modulus –non-uniform bending -Pin and microscope.
14. Determination of Rigidity modulus- Torsional pendulum (without masses).
15. Determination of Rigidity modulus – Static torsion
16. Sonometer –frequency of tuning fork.
17. Sonometer – A.C frequency - Steel and Brass wire.
18. Air wedge – thickness of a wire.
19. Spectrometer – Grating-Minimum deviation
20. Potentiometer – Measurement of Internal resistance of a cell.
21. Figure of merit of a galvanometer (Table galvanometer).
22. Construction of AND, OR NOT gates using diodes and transistors.
23. NAND gate as a universal gate.
24. 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-III SEM- V	Course Code: PH505S	Course Title: OPTICS AND SPECTROSCOPY	HRS/WK 5	CREDIT 4

Course Outcomes	
CO1	Study the basics of geometrical optics
CO2	Understand the basics of interference and its applications
CO3	Understand the basics of diffraction and its applications
CO4	Understand the basics of polarization and its applications
CO5	Study the various spectroscopy tools in day-today life

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 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: 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.

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.

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: PH506S	Course Title: ATOMIC PHYSICS	HRS/WK 5	CREDIT 4

Course Outcomes

CO1	Study the basics discharge phenomenon
CO2	Understand the basics of atomic structure
CO3	Understand the ionization potential and splitting of energy levels
CO4	Understand the basics of photoelectricity
CO5	Study the 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	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 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: 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 – Stern and Gerlach experiment. Spectral terms and notations – selection rules – intensity rule and interval rule – fine structure of sodium D lines – alkali spectra – fine structure of alkali spectra – spectrum of Helium.

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-photoelectric cells

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-III SEM- V	Course Code: PH507	Course Title: SOLID STATE PHYSICS	HRS/WK 5	CREDIT 4

Course Outcomes

CO1	Understand the types of bonds in solids
CO2	To study the different X-ray diffraction techniques
CO3	Study to the type of different types of magnetic materials
CO4	Study the properties of dielectrics
CO5	Understand the phenomenon of superconductivity

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 : **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: PH508	Course Title: BASIC ELECTRONICS	HRS/WK 5	CREDIT 4

Course Outcomes

CO1	Understand the basic of semiconductor devices
CO2	Study the working of rectifier and amplifiers
CO3	Study the working of oscillators
CO4	Understand the waveshaping and multivibrators
CO5	Understand the application of electronics in electrical circuite

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 : SEMICONDUCTOR DEVICES (15 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 - photo diode – Solar cell-different modes of operation – transistor biasing –characteristics in CB & CE modes –H-Parameters- α and β of a transistor.

UNIT –II : RECTIFIERS AND AMPLIFIERS (15 hours)

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 .

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 (15 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 (15 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 (15 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-III SEM- V	Course Code: EPH509T	Course Title: DIGITAL ELECTRONICS AND MICROPROCESSOR	HRS/WK 4	CREDIT 4
CO1	Understand the digital fundamentals			
CO2	Study on boolean algebra and simplification			
CO3	Understand the arithmetic circuits			
CO4	Study about the D/A and A/D converters			
CO5	Study on introduction to 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	3.2	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 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 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: EPH510	Course Title: MATERIALS SCIENCE	HRS/WK 5	CREDIT 3
CO1	Understand the classification of materials			
CO2	Understand the various phase diagram			
CO3	Get knowledge the phase transformation in solid materials			
CO4	Understand the electron theory of metals			
CO5	Understand the electrical and magnetic properties of 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	3.5	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 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: CLASSIFICATION OF MATERIALS (15 hours)

Material Science: - Engineering requirements of materials- Material structure- Types of Bonds and their energies – Bond formation mechanism- Ionic bond-covalent bond examples-ceramics- thermal and electrical properties – uses-Metallic bond-comparison of bond (dispersion bonds, dipole bonds and hydrogen bonds)-Crystal imperfection –Types of imperfections- Thermal vibrations – point, line and surface imperfections- Frank –Read source.

UNIT II: PHASE DIAGRAM (15 hours)

Basic terms- solid solutions- Hume – Rothery's rules- intermediate phase- Gibb's Phase rules- Time – temperatures cooling curves- construction of phase diagrams- the Lever rule- eutectic systems- eutecoid Systems- peritectic and peritectoid system-Ternary equilibrium diagrams.

UNIT-III: **PHASE TRANSFORMATION (15 hours)**

Rate of transformation- nucleation (homogeneous and heterogeneous)-nucleation and growth –applications of phase transformations –micro constituent of iron – carbon system –the allotropy of iron – Iron-Carbon equilibrium diagram- formation of Austenite- TTT diagram- transformation Austenite upon continuous cooling.

UNIT-IV: ELECTRON THEORY OF METALS (15 hours)

Fundamental theories of electrons (Drude and Lorentz theory and Sommerfield free electron theory) –electron energies in a metal- Zone theory of solids- energy gaps – density of states – Zones in conductors, insulators and semiconductors- factors affecting electrical resistance of materials.

UNIT V: ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS (15 hours)

Resistivity- conductivity- semiconductors –classsification of semiconductors on the basis of Fermi energy and Fermi levels- insulators –dielectrics –ferro electricity – electro strict ion- Piezo electricity –uses of dielectrics –capacitors dielectric strength-magnetic properties of materials –magneto strict ion-magnetic domain –soft and hard magnetic magnetic materials

TEXT BOOKS

1. Raghavan. V, *Materials science and Engineering a first course,* 3rd Ed., Presences Hall of India (pact) Ltd, 1990.
2. Arumugam, *Materials Science*, Anuradha Publications, 2015.

REFERENCE BOOKS

1. Kittel C., *Introduction to Solid State Physics*, 8th Ed., Wiley Eastern, 2012.
2. Manchandra V.K., *A text book of Materials Science*, New India Publishing House, 1992.

YEAR- III	PRACTICAL -V	PHP505
SEMESTER V		HRS/WK-6
PRACTICAL -5		CREDIT-4

(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: PH610S	Course Title: RELATIVITY, QUANTUM MECHANICS AND MATHEMATICAL METHODS	HRS/WK 5	CREDIT 4
CO1	Understand the theory of relativity			
CO2	Understand the concept of wave mechanics.			
CO3	Solving Schrödinger wave equation and applications.			
CO4	Understand the various mathematical physics			
CO5	Understand the various 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	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 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 : 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: PH611	Course Title: NUCLEAR AND RADIATION PHYSICS	HRS/WK 5	CREDIT 4
CO1	Study the various nuclear structure prediction.			
CO2	Occur knowledge on radioactive decay			
CO3	Under the various particle oscillators and detectors			
CO4	Understand the reactors and radiation physics			
CO5	Occur knowledge on 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	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 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 - 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: PH612S	Course Title: LASER AND FIBER OPTIC COMMUNICATION	HRS/WK 5	CREDIT 4
CO1	Understand the knowledge on laser physics			
CO2	Understand the different types of lasers and output modulation methods			
CO3	Study the various applications of laser			
CO4	study the various types of optical fibers			
CO5	Occur knowledge on fiber optic communication			

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 : LASER PHYSICS (15 hours)

Basic Principle of Laser – Einstein Coefficients – condition for light amplification – Population Inversion – Threshold Condition – Line shape function – Optical Resonators – Three level and four level systems.

UNIT - II : TYPES OF LASERS AND OUTPUT MODULATION METHODS (15 hours)

Solid State lasers – Gas lasers – He-Ne and CO_2 lasers – semiconductor lasers – Heterojunction lasers - Argon ion and Eximer Laser– Q switching and mode locking.

UNIT - III : APPLICATIONS OF LASER (15 hours)

Application of laser in industry – cutting and welding – Drilling – surface Hardening – Medical applications - laser as diagnostic and therapeutic tool – Holography – Theory of recording and reconstruction – application of Holography.

UNIT - IV : 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 – losses in fibers – fabrication techniques of fibers.

UNIT - V : 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.

TEXT BOOKS

1. Ashokamani-Laser
2. R. Murugeshan, *Modern Physics*, S. Chand & Co., 2009.
3. Senthil Kumar, *Engineering Physics*, VRB Publishers Pvt. Ltd., 2013.
4. K. Thyagarajan and Ajoy Ghatak, *Laser Theory and Applications*, Cambridge University Press, 1999.

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- VI	Course Code: PH613	Course Title: APPLIED ELECTRONICS	HRS/WK 5	CREDIT 4
CO1	understand the knowledge of special devices and applications			
CO2	obtain the knowledge on linear operational amplifier circuits			
CO3	Understand the applications of operational amplifier			
CO4	Understand the working of 555 timer and PLL			
CO5	Get knowledge 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	4.5	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 : 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-III SEM- VI	Course Code: EPH614S	Course Title: NUMERICAL METHODS AND COMPUTER PROGRAMMING	HRS/WK 4	CREDIT 3
CO1	Get detailed knowledge on solution of equation			
CO2	**S**tudy the various interpolation			
CO3	Explain the various numerical integration and differentiation			
CO4	Explain the different data type operators			
CO5	Study the various control statements			

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 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 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.
5. Rajaraman, *Computer Oriented Numerical Methods*, 3rd Ed., Prentice Hall India Learning Private Limited, 1993.

YEAR-III SEM- VI	Course Code: EPH613	Course Title: ENERGY PHYSICS	HRS/WK 5	CREDIT 3
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	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 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 **(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	PRACTICAL -VI	PHP606
SEMESTER - VI		HRS/WK-6
PRACTICAL - 6		CREDIT-4

(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

Question Paper Pattern -UG

THEORY EXAMINATION

Continuous internal assessment (CIA) UG (25 marks)

- Two internal Examinations 15 marks
- Assignment / Seminar 5 marks
- Attendance 5 marks

Total 25 marks

External Examination (75 marks)

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

Section – A (10 x 2 = 20)

(Two questions from each Unit)

Section – B (5 X 5 = 25)

(Answer all the questions)

Section C (3 X 10 = 30)

(Answer any Three Questions out of five)

PRACTICAL EXAMINATION

Continuous internal assessment (CIA) (40 marks)

Based on the periodical evaluation of record &
Experiments assessed by the staff in charge - 20 marks
Model Practical - 20 marks

External Examination (60 marks)

3 Hrs. Exam

Total Marks: 60

Experiment 50 Marks
Record 10 Marks