SEMESTER- III			
CORE – V– ELECTRONICS AND COMMUNICATION			
Code: 15UPHC31	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

Objectives:

To study the basic theorems

To study the working of diodes and transistors

To analyse different types of amplifier

To know about the concepts of feedback and its applications in an amplifier and an oscillator

To study the uses of various instruments applied for measurements

Unit I: Linear Circuit Analysis

Linear and non-linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h - parameters.

Unit II: Semiconductor Devices

Diodes: Semiconductors – P and N type semiconductors – P-N junction diode under forward bias, reverse bias – Silicon and Germanium diodes – Energy band diagram of p-n diode – V – I characteristics of a p-n diode – Experimental determination of knee voltage, ac .forward resistance and reverse saturation current of a p-n diode -Diode rectifier – Half wave rectifier-Expression for I_{dc}, I_{rms} , efficiency and ripple factor – Bridge rectifier – Zener diode - V-I characteristics – Voltage regulator.

Transistor: Junction transistor – Three modes of transistor connection – Relation between alpha and beta of transistor – Transistor parameter calculation for CE mode – Single stage transistor amplifier.

Unit III: Oscillators

Feedback – Negative voltage feedback amplifier – Principle – Gain – Advantages – Feedback circuit. Negative current feedback – Principle – Current gain – Effects – Emitter follower – D.C. analysis – Voltage gain – input impedance – Output impedance – Applications – Sinusoidal oscillator –Types –Oscillatory circuit. Positive feedback amplifier – Barkhausen criterion. Colpitt's oscillator, Hartley oscillator.

Unit IV: Operational Amplifier

Operational amplifier basic ideas – inverting amplifier – summing amplifier – differential amplifier – integrator & differentiator using Op amp – Instrumentation amplifier using Op amp-Differential Instrumentation amplifier using transducer bridge-application to measurement of temperature and as analog weight scale – Multivibrator (Astable, Monostable and Bistable using Op amp).

Unit V: Modulation and Demodulation

Radio Amplitude modulation – Modulated power output – Single side band transmission: A.M – Frequency Modulation – FM transmitter – Demodulation – Transmission of radio waves – Reception of radio waves – Superhetrodyne Receiver – Characteristics of a receiver.

Text Books:

1. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co. Ltd. 2006.

2. G. Jose Robin and A. Ubald Raj, Electronics (I Edition), Indira Publication, Marthandam,2000.

UNIT	BOOK	CHAPTER	PAGE NO. / SECTION NO.
I	2	1	1.01 – 1.30, 1.35 – 1.40
II	2	2,3	2.01 – 2.38, 3.01 – 3.13
III	1	15,16	15.1 – 15.14,16.1 – 16.3 ,16.5,16.7,16.10,16.11
IV	2	8A, 12	8.01 – 8.23, 12.03 – 12.12
V	2	7	7.01 – 7.33

Books for Reference:

1. R. S. Sedha, A text book of applied electronics, S. Chand & Co. Ltd. 2006

2. B. L. Theraja, Basic electronics (solid state), S. Chand & Co. Ltd. 2003.

3. N. N. Bargava, D. C. Kulshreshtha, S. C. Gupta, Basic Electronics and linear circuits, Tata McGraw Hill Publishing company Ltd, reprint 2012.

SEMESTER- V			
CORE – VII – DIGITAL ELECTRONICS			
Code: 15UPHC51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :5**

Objectives:

To gain knowledge about the binary numbers, Boolean Algebra and Flip Flops.
To study the construction and working of Registers, Counters , A/D and D/A Converters.

Unit I : Number System and Logic Gates

Decimal, binary, hexadecimal, binary-coded decimal numbers-conversion of one two another –addition subtraction of binary numbers by 2's complement method. Digital circuits-logic gates-positive logic and negative logic systems-Basic logic gates-AND, OR, NOT gates-characteristics of logic gates-NOR, NAND gates-Exclusive OR gate-Boolean equation of logic circuits-Boolean equation and logic circuits from truth table-standard forms of expressing logic functions-Boolean algebra-De Morgan's law-NAND,NOR as universal building block-Binary adder-Half adder-Full adder-Half subtractor-Full subtractor.

Unit II: Karnaugh Map

Karnaugh map –Two variable map-Three variable map-four variable map-method of addressing a cell in map-preparation of truth table from Karnaugh map-Don't care conditions-simplification of product-of-sums (karnaugh map using Max terms).

Unit III: Binary Adders and converters

Parallel binary adder- Parallel subtractor using 2's complement system – BCD Adder-Excess 3-code-Excess-3 Adder- Parity Generator and Parity Checker, variable resistor networks, binary ladders, D/A converters, D/A Accuracy and Resolution, A/D converter-simultaneous Conversion, continuous A/D conversion.

Unit IV: Flip –Flops and 555 Timer

IC 555 Timer-as Monostable and Astable Multivibrator-RS Flip flop-clocked RS flip flop-JK Flip flop-JK Master Slave Flip flop-Divide by 2 counters with D Flip flop-T Flip flop.

Unit V: Counters and Registers

Binary counter-Decade counter-Up down counter –Synchronous and asynchronous counters –Shift Register-Registers with parallel load-serial transfer in Register.

Text Books:

1. G. Jose Robin, A.Ubald Raj, Integrated Electronics.
2. Albert Paul Malvino and Donald P. Leach, Digital principles and applications, 7^{th} edition 2013.

UNIT	BOOK	CHAPTER	PAGE NO.
I	1	2A, 2B, 2C	2.01 – 2.13, 2.21 – 2.77
II	1	2D	2.78 – 2.98
III	1 & 2	3 & 12	3.01 – 3.14 & 438 - 463
IV	2 & 1	7 & 3	253 – 258 & 3.18 – 3.35
V	1	4	4.01 – 4.20

Books for reference:-

1. Millman and Taub, Integrated Electronics, International student edition, (TMH)
2. R. P. Jain, Modern digital Electronics, Tata Mc Graw Hill Pvt. Ltd, 4^{th} reprint 1988.

SEMESTER-IV			
SBE– BIO MEDICAL INSTRUMENTATION			
Code: 15UPHS41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objectives:

To have the functional elements of measuring instruments
To acquire the knowledge on the application of Physics in the field of medicine.

Unit I : Human Physiological Systems

Introduction - Cells and their structures - Nature of Cancer cells - Transport of ions through the cell membrane - Resting and action potentials - Nerve tissues and organs - Different systems of human body.

Unit II: Biosignal Acquisition

Introduction - Physiological signal amplifiers - Isolation amplifiers - Medical preamplifier design -Bridge amplifiers.

Unit III: Biopotential Recorders & Assist Devices

Introduction - Characteristics of the recording system - Electrocardiography(ECG) - Electroencephalography(EEG) - Introduction - Pacemakers - Pacemaker batteries - Artificial heart valves.

Unit IV: Specialised Medical Equipment

Introduction - Blood cell counter - Electron microscope - Radiation detectors - GM Counter, Bubble Chamber – Photometer - Filter photometer, Spectrophotometer – Chromatography - Audiometers.

Unit V: Advances in Biomedical Instrumentation

Introduction - Computers in medicine - Lasers in medicine – Endoscopes - Cryogenic surgery -Computer tomography.

Text Book:

1. Dr.N.Arumugam, Bio-medical Instrumentation, Anuradha Publications, reprint 2014.

UNIT	CHAPTER	SECTION NO.
I	1	1.1 - 1.8
II	3	3.1 - 3.5
III	4 & 5	4.1-4.5, 5.1 -5.4
IV	7	7.1–7.3, 7.4(a), 7.4(c), 7.5, 7.5.1,7.5.2,7.5.5,7.7
V	10	10.1-10.5,10.7

SEMESTER- V			
SBE – PHYSICS FOR COMPETITIVE EXAMINATIONS			
Code: 15UPHS51	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :3**

Objective:

To prepare the students for competitive exams and make them competent in facing the challenges with confidence.

Unit I: Fundamentals of Physics

Units-Trignometric-numerical constants-Derivative and Integrals- unit conversion factors-some fundamental physical constants- units and dimensions.

Refer:S.L.Kakani&Hemarajam - vol 2. Pg XV-XIX

Unit II: Properties of matter

Gravitation, Escape velocity & artificial satellite (Refer : chapter7) Surface Tension & viscocity (Refer : chapter8)

Refer: S. L. Kakani

Unit III: Heat & Optics

Thermometry – Calorimetry - Thermal expansion - Law of thermodynamics.

Refer: Objective Physics, Satya Prakash (chapter A (17, 18, 20) – pg. A433 – A471, A499 – A529)

Unit IV: Electromagnetism

Magnetic effect of current – Meters – Magnetism – Electromagnetic induction – Electromagnetic waves.

Refer: Objective Physics, Satya Prakash (chapter C (5, 6, 7, 8, 10) pg. C179 – C309, C342 – C352)

Unit V: Modern Physics

Quantum nature of light – Atomic models and spectra – X-Rays – radioactivity- Properties of nucleus- Nuclear energy – Matter waves and relativity.

Refer: Objective Physics, Satya Prakash (chapter D(1, 2, 3, 4, 5) pg. D3-D121)

Text Books:

1. Satya Prakash, Er.Vibhav Saluja, Objective Physics, A.S.Prakashan publications, Meerut 27th revised edition 2010.
2. Dr.S.L.Kakani, Objective Physics, Sultan chand and sons Ltd. 10th revised edition (2001).

SEMESTER V			
Common Core Core VII – Solid state and Material Science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/Sem :90**	**Credits : 4**

Vision: To understand the usage of the appropriate materials while designing electronic system

Mission: To enrich the students with the knowledge of theory and properties of different materials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	understand the basic symmetry elements and operations of crystals	1, 2	Un
CO– 2	distinguish the types of crystals and enumerate the various crystal imperfections	3,4	An
CO–3	get a clear knowledge about metallic glasses, ceramics and biomaterials.	1, 3, 5,7, 8	Re
CO –4	justify the wave nature of matter and its experimental study	1,3	Ev
CO –5	apply Bragg's law for x –ray study	2	Ap
CO –6	distinguish magnetic materials based on susceptibility	1,2	An
CO –7	use magnetic materials in various field	1,2	Ap
CO –8	discuss the synthesis methods of nano materials	2,3	Un

SEMESTER V			
Common Core Core VII – Solid state and Material Science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/Sem :90**	**Credits : 4**

Unit I: Crystal Structure and Crystal imperfections

Crystal lattice – Primitive and unit cell – Basic symmetry elements and operations – Plane of Symmetry, centre of symmetry & axis of symmetry – Types of Crystals – Bravais lattices – Simple cubic, body centered, FCC structures with an example – Miller indices, Inter planar spacing – Crystal imperfections – Point defects – Schotty and Frenkel defects – Line Defects –Edge & screw dislocations – Surface defects – Volume defects(imperfection).

Unit II: New Materials

New materials – Metallic glasses – Fibre reinforced plastics – Fibre reinforced metals – Bio materials – Ceramics – Cements – High temperature materials – Intermetallic compounds – Alloys – Smart materials.

Unit III: Wave Nature of Matter and X-ray Diffraction

Wave nature – Introduction – De Broglie Hypothesis – Experimental study of matter waves – Davision –Germer's experiment – Heisenberg's Uncertainity Principle.

Bragg's law – Derivation of Bragg's equation – Experimental methods of X –ray study – Laue rotating crystal and powder methods.

Unit IV: Magnetic and Dielectric materials

Classification of magnetic materials – Langvein theory of diamagnetism – Theory of Paramagnetism – Domain theory of Ferromagnetism – Antiferro magnetic materials – Application of Different magnetic materials.

Dielectric materials – Types of dielectric materials – Different types of electric polarization – Internal field – Clausius –Mossotti equation – Frequency and temperature dependence of dielectric constant.

Unit V: Nanomaterials

Nanomaterials – Synthesis – Plasma Arcing – Chemical vapour Deposition – Sol gels – Electro deposition – Ball milling – Properties of nano particles and applications. Carbon nanotubes fabrication – Arc method – Pulsed laser deposition – Chemical vapour deposition – Structure –properties – applications.

Text books:

1. M.Arumugam Material Science, Anuradha Publications, 2008.
2. C M Sri Vasta & C Srinivasan, Science of Engineering materials, New Age International (P) Ltd, Second Edition, 1999.
3. P. K. Palanisamy, Solid state Physics Copyright (2003), Scitech Publication (India) Pvt Ltd, Chennai, 3rd reprint, 2008.

4. R.Murughesan, Modern Physics, Kiruthiga Sivaprasath, S.Chand & Co Ltd, 17th Edition2013.
5. Dr. P. Mani, A Text book of Engineering Physics, Dhanam Publications Chennai, RevisedEdition, 2008.

Book for Reference:

1. Charles Kittel, Introduction to solid State Physics, John Willey and sons, 2010.
2. P. K. Palanisamy, Material Science, Scitech Publication (India) Pvt Ltd .,Chennai, 2005.
M.H Fulekar, Nano Technology: Importance and Application, I K International PublishingHouse Pvt Ltd, 2010.

SEMESTER V			
Core VIII	**Digital Electronics**		
Code : 18UPHC52	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To enlighten our students on the concepts of digital electronics

Mission: To make our students understand number systems, logic gates and semiconductor devices and memories

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	define binary numbers	2	Re
CO –2	explain number system	2	Un
CO –3	construct logic gates	2, 4,6	Cr
CO –4	recall the fundamental concepts and techniques used in digital electronics	2	Re
CO –5	analyze the construction of shift register	2,5	An
CO –6	design registers, interpret logic functions, circuits and truth tables.	2, 4	Cr
CO –7	design counters, understand the concepts of decimal number system.	2,5	Cr
CO –8	differentiate A/D and D/A conversions	2, 4	An

SEMESTER V			
Core VIII	**Digital Electronics**		
Code : 18UPHC52	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Arithmetic Circuits

Binary to decimal system – Decimal system to binary system – Octal system – Hexadecimal System – Excess 3 Code – Gray Code – Binary addition – Subtraction – Unsigned Binary numbers 2's complement – Half adder – Full adder –Half subtractor – Full subtractor.

Unit II: Logic circuits

Boolean algebra – OR, AND and NOT operation – Boolean equation – Logic circuits – Boolean theorems and Basic laws – De Morgan's theorem – Duality theorem – Sum of products – Product of sums – Karnaugh map – Pairs, Quads and Octets – Karnaugh map simplification.

Unit III: Data processing circuits

Flip –Flops: R –S flip flop – Clocked RS flip flop – JK flip flop – JK master slaveflip flop – Schmitt trigger.

Multiplexer – Demultiplexer – 1-16 decoder – BCD to decimal decoders – Sevensegment decoder – Encoder – Parity checker and generator.

Unit IV: Shift registers and counters

Serial in register – Serial out register – Serial in–parallel out register – Parallel in-serialout register – Parallel in–parallel out register.

Ring counter – Binary counter – Decade counter UP/DOWN counter – Mod 3 counter –Mod 5 counter.

Unit V: Semiconductor memories:

ROM– RAMS – SRAMS – Dynamic RAMS.

A/D and D/A conversion:Variable resistor network – Binary ladder – A/D conversion –D/A conversion – Simultaneous conversion – Continuous AD conversion.

Text Books:

1. G. Jose Robin, A. Ubald Raj, Integrated Electronics, Indira Publications,Marthandam, second edition, 2002.
2. Albert Paul Malvino and Donald P. Leach, Digital principles and applications,7th edition 2013.

Books for Reference:

1. Millman and Taub, Integrated Electronics, International student edition, (TMH)

R. P. Jain, Modern digital Electronics, Tata Mc Graw Hill Pvt. Ltd., 4th Reprint1988.

SEMESTER V			
Core IX	**Computational Physics**		
Code : 18UPHC53	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To achieve programming logic by using all C++ features and to become a good programmer in C++

Mission: To apply the knowledge of computing fundamentals and mathematics to write programs in C++

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	utilize their knowledge of C++ programming language and write programs for solving various problems in physics	6,8	Ap
CO –2	design a program for operator overloading	6	Cr
CO –3	distinguish between one dimensional and two dimensional arrays	6	An
CO –4	define various types of constructors	6	Re
CO –5	design a simple C++ program for function	6	Cr
CO –6	define a class	6	Re
CO –7	differentiate constructors and destructors	6	An
CO –8	solve the problem in Bisection method	6, 8	An

SEMESTER V			
Core IX	**Computational Physics**		
Code : 18UPHC53	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Tokens and Expressions

Tokens– Keywords – Identifiers and Constants – Basic data types – User defined data types – Derived data types – Symbolic constants – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ – Scope resolution operator – Member dereferencing operators – Memory management operators – Manipulators – Expressions and their types – Control structures.

Unit II: Functions, Classes and Objects

Functions in C++ – The main function – Function prototyping – Call by reference – Return by reference – Inline functions – Default arguments.

Specifying class – A simple class example – Creating objects – Accessing class members – Defining member functions – Nesting of member functions – Private member functions – Arrays within a class – Arrays of objects – Objects as function arguments – Returning object.

Unit III: Constructors and Operator Overloading

Constructors – Parameterized constructors – Multiple constructors in a class Dynamic constructor – Copy constructors – Destructors.

Defining operator over loading – Overloading unary operators – Overloading binary operators – Manipulation of strings using operators – Rules for overloading operators.

Unit IV: Inheritance and Managing Console I/O Operations

Defining derived class – Single inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance.

C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators – Designing our own manipulators.

Unit V: Numerical Methods (No derivations)

Iterative methods: Bisection method, Newton – Raphson method – Solution of linear simultaneous equations: Gauss elimination method – Method of least squares: Straight line – Interpolation: Newton's forward and Lagrange's interpolation – Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule – Solution of differential equation: Taylor's series method.

Text Book:

1. E. Balagurusamy, Object oriented programming with C++, Tata McGraw – Hill publishing company Ltd. New Delhi, 4th Reprint 2015.

2. J.N.Sharma, Numerical Methods for Engineers and Scientists, Narosa PublishingHouse, New Delhi, Reprint 2008.

Book for Reference:

1. D. Ravichandran, Programming in C++, Tata Mc. Graw Hill Publishing companyLtd. New Delhi.

T.Veerarajan, T. Ramachandran, Numerical Methods with Programs in C, TataMcGraw Hill publishing company Ltd. New Delhi, Fifth reprint 2010.

SEMESTER VI			
Core X	**Modern Physics**		
Code :18UPHC61	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To enlighten our students on the Atomic, molecular, optical and quantum physics

Mission: To understand the theory and applications of emission, absorption and scattering of electromagnetic radiation.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe Michelson –Morley experiment	2	Un
CO –2	list the Postulates of special theory of relativity	2	Re
CO –3	apply Pauli's exclusion principle to periodic table	2	Ap
CO –4	illustrate L –S coupling	2	Ap
CO –5	differentiate the Characteristic and continuous X – ray spectrum	2,5	An
CO –6	define Bragg's law	2,5	Re
CO –7	evaluate Davisson and Germer's experiment	2	Ev
CO –8	apply Bohr's quantization of angular momentum to the hydrogen atom	2	Ap

SEMESTER VI			
Core X	**Modern Physics**		
Code :18UPHC61	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Relativity

General theory – Michelson – Morley experiment – Postulates of special theory of relativity – Lorentz transformation – Length contraction – Time dilation – Relativistic condition of velocities – Simultaneity – Relativistic mass – Relativistic momentum – Mass and energy equivalence – Relation between total energy and rest mass, rest mass energy and momentum.

Unit II: Atomic Structure and Spectra

The vector atom model – Quantum numbers associated with vector atom model – coupling schemes – L-S coupling – j-j coupling – Pauli's exclusion principle – Application to periodic table – Magnetic dipole moment due to orbital and spin motion of the electron – Stern and Gerlach experiment – Zeeman effect – Experimental study of Zeeman effect – Larmor's theorem – quantum mechanical explanation of normal Zeeman effect.

Unit III: X – Rays

Production of X – rays – Coolidge tube – Properties of X –rays – Bragg's law – Bragg spectrometer – X-ray spectra – Characteristic and continuous X- ray spectrum – Moseley's law and its significance – Compton Effect – Compton Effect and its experimental verification.

Unit IV: Wave Properties of Matter

Wave velocity and group velocity – Relation connecting them – Basic postulates of quantum mechanics – Derivation of time dependent and time independent Schrodinger's equation – Physical interpretation of the wave function – Properties of wave function – Operators in quantum mechanics – Eigen functions, Eigen values and Eigen value equations – Expectation values – Transition probability.

Unit V: Development of Quantum Mechanics

Introduction – Black body radiation – Theoretical laws of black body radiation – Plank's quantum theory – Photo-electric effect – Einstein explanation of photo electric effect – The Ritz combination principle in spectra – Stability of an atom, Bohr's quantization of angular momentum and its application to the hydrogen atom – Particle in one dimension and three dimensional box.

Text Books:

1. R. Murugeshan, Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co. Ltd. 12threvised edition 2006.
2. Kamal Singh, S.P. Singh, Quantum Mechanics, S. Chand & Co Ltd., 1998.

Books for Reference:

1. Brijlal and Subramanyam, Modern Physics, 8th edition, 2007
2. J.B. Rajam, Atomic Physics, 8th edition, S. Chand & Co.1981.

SEMESTER VI			
Core XI	**Nuclear and Particle Physics**		
Code :18UPHC62	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To enrich our students with the knowledge of nuclear and particle physics

Mission: To study the properties of α, β, γ rays, process of radioactivity and its applicationsand various detectors

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the structure of nuclei	2	Re
CO –2	understand simple nuclear models	2	Un
CO –3	explain properties of α, β, γrays and their decay	2	Un
CO –4	analyze the key features of nuclear fission and its applications	2	An
CO –5	analyze the key features of nuclear fusion and its applications	2	An
CO –6	understand the principle and working of particle accelerators	2	Un
CO –7	understand the principle and working of particle detectors	2	Un
CO –8	describe the constituent particles in the electron, proton and neutron	2	Un

SEMESTER VI			
Core XI	**Nuclear and Particle Physics**		
Code :18UPHC62	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Introduction to nucleus

Introduction – Classification of nuclei – General properties of nucleus: Nuclear density, Nuclear charge, Spin angular momentum, Resultant angular momentum, Nuclear magnetic dipole moment – Binding energy– Nuclear stability– Theories of nuclear composition– Non -existence of electron within the nucleus – Nuclear forces

– Meson theory of nuclear forces – Liquid drop model – The shell model – Neutrons: The discovery of the Neutron – Basic properties of the Neutron – Classification of Neutrons – Neutron Sources – Neutron Detectors.

Unit II: Radioactivity

Discovery of radioactivity – Natural radioactivity – Alpha, Beta and Gamma Rays – Properties of α, β, γ rays – Determination of e/m of α particles – Determination of charge of alpha particles –Range of alpha particles,Geiger Law, Geiger –Nuttal Law(definition only) –Theory of α decay – The nature of Beta Particles – Origin of γ rays – Soddy Fajan's Displacement law – Law of Radioactive disintegration – The mean life – Unit of Radioactivity – Law of successive disintegration – Biological Effects of Nuclear Radiations.

Unit III: Nuclear Reactions

The discovery of artificial transmutation –Bohr's theory of nuclear disintegration – The Q –value equation for a nuclear reaction – Nuclear reactions – Energy Balance in Nuclear Reactions and the Q – Value – Threshold energy of an Endoergic Reaction – Nuclear Transmutation.

Nuclear Fission and Fusion: Discovery – Nuclear Fission – Energy Released in Fission– Chain Reaction – Nuclear reactor – Uses of nuclear reactor – Nuclear fusion

– Sources of stellar energy – Thermonuclear reactions.

Unit IV: Particle Accelerators and Detectors

Linear Accelerator – Cyclotron –Synchro-cyclotron– Betatron– Ionization chamber – Geiger Mullar counter– Scintillation counter – Wilson cloud chamber.

Unit V :Elementary Particles

Introduction– Particles and Anti-particles – Antimatter – The fundamental interactions – Elementary – Particle quantum numbers – Conservation laws and symmetry – The Quark model.

Text Book:

1. R.Murughesan, Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co Ltd. 12th revisededition, 2006.

Book for Reference:

1. A. Gupta, Modern Physics, 1st edition, Book and Allied Pvt. Ltd , 2006.
2. D.C Tayal, Atomic and Nuclear Physics, 3rd revised edition, Himalaya Publishing House,1998.

SEMESTER VI			
Core XII	**Opto Electronics & Fibre Optic Communication**		
Code :18UPHC63	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To make our students at ease with optoelectronics and communication physics

Mission: To make our students knowledgeable in the field of optoelectronics and fibre optic communication

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the basic principles of semiconductors	2	Re
CO –2	understand the formation of energy bands of semiconductors	2	Un
CO –3	list out the optical characteristics of semiconductors	2	Re
CO –4	explain the principle and working of optical sources	2	Un
CO –5	categorise the optical detectors and their principles	2	An
CO –6	analyze and classify the structure of optical fibres, its types and various optical losses	2	An
CO –7	understand the basics of signal propagation through optical fibres	2	Un
CO –8	understand the types and various optical losses	2	Un

SEMESTER VI			
Core XII Opto Electronics & Fibre Optic Communication			
Code :18UPHC63	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Optical Characteristics of Semiconductors

Introduction – Light units – Formation of energy bands in semiconductors – Energy band diagram – Direct band gap and indirect band gap semiconductors – Mobility, current density and electrical conductivity – Optical absorption – Optical absorption coefficient – luminescence – Photoluminescence – Electroluminescence – Excess carrier recombination and minority carrier life time – Photoconductivity – photoconductive decay – Experiment to study photoconductive decay – Haynes and Shockley experiment for determination of minority carrier mobility

Unit II: Optical Sources for Optical Fibres

LED – Laser – Fundamentals – Types: Ruby Laser – He-Ne Laser – Heterojunction Laser – CO_2 Laser – Opto electronic couplers – Parameters of opto electronic coupler.

Unit III: Optical detectors

The need for optical detectors – Photo diode – Performance parameters of photodiode –Silicon p–i–n photodiode – Heterojunction Photodiode – Phototransistor – Photo multiplier –Photo thyristor - Photothermistor.

Unit IV: Fibre Optics

Introduction – Different types of fibres – Light propagation through step index fibre: Acceptance angle – Numerical aperture – Numerical aperture of Graded index fibre – Losses in Fibre: Absorption Losses –Scattering Losses: Rayleigh scattering loss and Mie scattering loss –Dispersion in fibres: Types of dispersion – Theory of material dispersion.

Unit V: Fibre optic communication

Analog optical communication system– Digital optical communication – Different generation in optical fibre communication – Advantages – Modulation: Different types of modulation methods –Modulation formats – External modulators: Electro optic modulators (Pockels Effect) – Acousto optic modulators – Demodulation Scheme: Homodyne and Heterodyne detection schemes.

Text Books:

1. Dr. M. Arumugam, Semiconductor physics & optoelectronics, Anuradha Publications,First edition, Reprint 2009.
2. A. Ubald Raj, G. Jose Robin, Optoelectronics, Indira Publication, Reprint 2012.

Book for Reference:

1. Pallab Battacharya, Semiconductor optoelectronic devices, Pearson Education, NewDelhi, Second edition, 2000.
2. Ajoy Ghatak, Optics, McGraw Hill Education(India) Private Limited, Fourth reprint2014.
3. Ajoy Ghatak and K.Thyagarajan, Introduction to Fibre optics, Cambridge UniversityPress India Pvt. Ltd., Reprint 2011

Subir Kumar Sarkar, Optical fibre and fibre optic communication system, S.Chand & company, First edition, Reprint 2008

SEMESTER V			
Core Integral I	**Renewable Energy Sources**		
Code :18UPHI51	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To enhance the students to understand about renewable energy sources and their utilisations

Mission: To create awareness among the students about sustainable utilisation and conservation of natural resources

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	construct solar ponds for water desalination, solar cookers and solar green houses	7, 5	Cr
CO –2	assess the working of windmills used for power generation	7	Ev
CO –3	list the renewable energy sources available in surplus	7	Re
CO –4	explain different types of solar water heaters	7,5	Un
CO –5	sketch out the classifications of WEC system	7	Ap
CO –6	recall Green house effect	7	Re
CO –7	discuss Energy audit	7	Un
CO –8	design KVIC plants for bio gas generation	7	Cr

SEMESTER V			
Core Integral I	**Renewable Energy Sources**		
Code :18UPHI51	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Solar Energy

Introduction – Solar Constant – Solar Radiation at the Earth's Surface : Beam and Diffuse Solar Radiation, Attenuation of Beam Radiation – Solar Radiation Measurements: Pyrheliometers, Pyranometers, Sunshine Recorder – Solar Radiation Data – Solar Energy Collectors: Introduction – Conversion of Solar Radiation into Heat
– Green House Effect – Flat –Plate Collectors: Introduction – Typical Liquid Collector – Advantages of Flat Plate Collectors.

Unit II: Solar Energy Storage and applications

Introduction – Solar Energy Storage Systems: Thermal Storage – Chemical Storage – Solar Pond: Introduction – Principle of Operation and Description of Non-convective Solar Pond –Extraction of Thermal Energy –Applications of Solar Ponds – Applications of Solar energy: Agriculture and Industrial Process heat – Solar Distillation – Solar Cooking: Box type Solar Cooker – Green House effect – Solar Green Houses (Introduction, Types, advantages, parameters for plant growth and Green house environment and control) – Global Warming.

Unit III: Wind Energy

Introduction – Basic Principles of Wind Energy Conversion: The nature of the wind – The power in the wind (only theory) – Wind energy conversion – Wind data and energy estimation – Site selection considerations – Basic components of a WECS (Wind Energy Conversion System) – Classification of WEC systems – Advantages and disadvantages of WECS – Applications of wind energy – Safety systems – Environmental aspects.

Unit IV: Energy Conservation

An Economic Concept of Energy – Principles of Energy Conservation and Energy Audit
– Types of Energy Audit – Energy Conservation Approach: Energy saving devices eligible for higher depreciation – Renewable energy devices eligible for higher depreciation – Co-Generation – Waste Heat Utilization – Heat Recuperators (Definition and Uses) – Heat Regenerators– Instrumentation and control.

Unit V: Other Conventional Energy Sources

Biomass energy – Classification – Biomass conversion Technologies: Wet and Dry Processes – Photosynthesis – Biogas generation – Advantages of Anaerobic Digestion – Factors Affecting Biodigestion – Types of biogas plant (KVIC Digester) – Geothermal energy (Introduction, Applications and advantages) – Ocean Thermal Electric Conversion (OTEC – Basics

principle) – Method and Working Principle of Closed OTEC.

Text Book:

1. G. D. Rai, Non conventional Energy Sources, Khanna Publishers, Reprint 2014.

SEMESTER VI			
Core Integral II	**Advanced Physics**		
Code :18UPHI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To make our students experts in areas of advanced Physics

Mission: To train our students in the areas of laser, microprossor, nanotechnology and nuclear spaced materials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall laser and its applications in medicine industry	3	Re
CO –2	list out the applications of Holography	3	Re
CO –3	solve arithmetic operations using 8085	5,6	An
CO –4	draw 8085 MPU	5,6	An
CO –5	formulate a program to write two hexadecimal numbers using 8085	5,6	Cr
CO –6	discuss BCS theory	2	Un
CO –7	assess the usage of Superconductors	3	Ev
CO –8	list the materials and its properties for nuclear and space applications	2	Re

SEMESTER VI			
Core Integral II	**Advanced Physics**		
Code :18UPHI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Applications of Laser

Application of laser in material processing – Laser drilling – laser cutting – Laser welding – Experimental welding – Air pollution monitoring – Water pollution monitoring – Propagation of laser radiation through atmosphere – Laser remote sensing – LIDAR – Raman LIDAR – Sensing wind velocity using laser – Holography

– Applications.

Unit II: Microprocessor architecture

Microprocessor – Microprocessor instruction set and computer language – Microprocessor architect and its operations – Input and output devices – Microcomputer system – Logic devices for interfacing – 8085 MPU.

Unit III: Programming the 8085

8085 programming model – Instruction classification – Instruction and data format

– How to write, assemble and execute simple programs – Instruction set – Data transfer operations – Addressing modes – Arithmetic operations – Logical operations – Branching operations.

Unit IV: Superconductors

Superconductivity – Effect of magnetic field– The Meissner effect – Effect of current

– Type I and Type II superconductors – Thermal properties – Isotope effect – London equations – BCS theory– flux quantisation – Josephson's effect – Application of superconductors – High Tc superconductor – Application of superconductor.

Unit V: Materials For Nuclear and Space Applications

Nuclear fuels – Fuel cladding – Moderators, control materials – Coolants – Shielding materials – Space programme – Structural material and their properties – System requirements – Extreme high temperature materials for thermal protection – Pressure vessels – Lubrication.

Text Books:

1. R. Murugeshan, Optics and spectroscopy, S. Chand & Co. (1995).
2. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing (India) Private Limited, Fifth edition, (2011).
3. P.K. Palanisamy, Solid state Physics, Scitech publication (India) Pvt

Ltd., Chennai. 3rd Reprint (2008).

4. CM Sri Vastava, C & C. Srinivasan, Science of Engineering materials and Carbon Nanotubes, New Age International Publishers, Third Edition.

Books for Reference:

1. Physics education, volume 19, No.1, April – June 2002
2. Dr. Arumugham, Bio medical instrumentation, Anuradha Agencies, Reprint 2014.
3. M.H Fulekar, Nano Technology: Importance and Application, I K International Publishing House Pvt Ltd, 2010.

SEMESTER VI			
Core Integral III Microprocessor 8086 and Microcontroller			
Code :18UPHI62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To develop background knowledge and core expertise in 8086 microprocessor and 8051 microcontroller

Mission: To expose the students to the architecture and instruction set of 8086microprocessor and 8051 microcontroller

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	explain the architecture of 8086 Microprocessor	5,6	Un
CO –2	categorise addressing modes of the 8086 Microprocessor	5,6	An
CO –3	understand instruction set of the 8086 Microprocessor	5,6	Un
CO –4	recall the basic introduction to 8051microcontroller	5,6	Re
CO –5	understand instruction Set and Programming of the 8051 microcontroller	5,6	Un
CO –6	design the assembly level programs using instruction set	5,6	Cr
CO –7	sketch the architecture of 8051 microcontroller	5,6	Ap
CO –8	compare timers and counters	5,6	An

SEMESTER VI			
Core Integral III Microprocessor 8086 and Microcontroller			
Code :18UPHI62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Architecture of 8086 Microprocessor

Introduction – Architecture of 8086 – Bus Interface Unit - Execution Unit – Fetch and Execute – Process of Fetching and Decoding of instructions – Registers – Data registers –Segment Registers –Pointer and Index Registers – Flag Register.

Unit II: Addressing modes of the 8086 Microprocessor

Logical and physical address – Address bus, Data bus, Control Bus – Memory Segmentation – 8086 memory addressing-8-bit data from Even – Address bank-8-bit data from odd Address bank – 16-bit data starting from Even Address bank – 16-bitdata starting from odd Address bank.

Unit III: Instruction set of the 8086 Microprocessor

Pin description of 8086 – memory read and write bus cycle of 8086 – 8086 instruction set.

Unit IV: Introduction to microcontroller

Introduction – Architecture of 8051 microcontroller – Memory organization – Pin diagram of 8051 microcontroller – Timers/ Counters – Serial communication

Unit V: Instruction Set and Programming of the 8051 microcontroller

Introduction – Addressing modes- 8051 instruction set – logical instructions – Data- transfer instruction - Boolean variable manipulation – Simple examples in assembly – Language programs of 8051 microcontroller – Assembly – Language programs.

Text Book:

1. Microprocessors and Microcontrollers, Soumitra Kumar mandal, Tata McGraw HillEducation Private Limited, New Delhi.

SEMESTER V	
Self Study	**Bio Physics**
Code :18UPHSS3 (Compulsory)	**Credits : 2**

Vision: To enhance the students to apply the principles and techniques of Physics to Biology

Mission: To make the students to know about the physiology of respiration and resolving power of eye which uses the principle of Physics

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	define Poiseueille ‘s formula	1,2	Re
CO –2	recall polarization	1,2	Re
CO –3	compare transverse and longitudinal waves	1,2	An
CO –4	use of Doppler effect	1,2	Ap
CO –5	diagrammatically show retina and photo receptor	2	An
CO –6	understand the Physiological characteristics of sound	1,2	Un
CO –7	define the terms thermodynamics	1,2	Re
CO –8	identify the non –linearity of human ear response	2	Un

SEMESTER V	
Self Study	**Bio Physics**
Code :18UPHSS3 (Compulsory)	**Credits : 2**

Unit I: Bio Mechanics

Bio Statics: Forces and Torques – Bio Physics of Muscle – Strength of Bones – Bio Dynamics: Newton's Laws – Frictional Forces and Stoke's Law.

Unit II: Biophysics and Fluid Flow

Steady Laminar Flow: Coefficient of viscosity – Poiseuille's Formula: Velocity Profile – Continuity Equation – Flow network and equivalent resistance – Energetics of Fluid Flow – Turbulence – Reynolds Number – Hemodynamics.

Unit III: Biophysics and Gas Transport

The Ideal Gas – Dalton's Law of Partial Pressure – Vapour Pressure – Convective Transport of Gases – Transport of O_2 in Blood – Transport of CO_2 in Blood – Diffusion of Gases: Fick's Law – Gas exchange in lungs – Physiology of Respiration (Definitions associated with the operation of lungs)

Unit IV: Biophysics and Audition

Transverse and Longitudinal Waves – Wave Velocity – Intensity of a Wave – Physiological Characteristics of Sound – Human ear: Phase sensitivity and determination of direction – Non-linearity of ear response.

Unit V: Physics of Vision

Wave Nature of Light – Polarization – Particle Nature of Light – Geometrical Optics – Refraction – Gradient Index Lens –Spherical Aberration – Refractive Power –Refractive Power of Eye – Retina and photoreceptors – Resolving power of eye – Polarization and vision.

Text Book:

1. K Srivastava, Elementary Biophysics , Narosha Publishing House Pvt. Ltd., Reprint2006

SEMESTER I / III			
Allied Physics – Paper I - I B.Sc., Mathematics / II B.Sc., Chemistry			
Course Code : 21UPHA11	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Objective:

1. To understand the principle behind various physical phenomena and apply them in appropriate situations.
2. To learn the concept involved in elasticity, bending of beams
3. To understand the basic principles of heat, light and ultrasonic through the systematic study of theory and experiments.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define fundamentals of elasticity and discuss concepts of stress and strain and the relationship between both, use the stress-strain equations to solve the problems of elastic modes	1	**R, U**
CO-2	solve problems related to uniform and non-uniform bending of beams	1	**An**
CO-3	tell about the terms viscosity and surface tension	1	**R**
CO-4	describe the properties of fluids such as viscosity, surface tension and evaluate the value of coefficient of viscosity	1,2,6	**U,E**
CO-5	estimate the thermal conductivity of a bad conductor	1,2,6	**E**
CO-6	calculate the specific heat capacity of a liquid	1,2,6	**An**
CO-7	calculate the thickness of a thin wire by forming interference fringes	1,2,6	**An**
CO-8	evaluate the dispersive power and resolving power of a grating	1,2,6	**E**

SEMESTER I / III			
Allied Physics – Paper I - I B.Sc., Mathematics / II B.Sc., Chemistry			
Course Code: 21UPHA11/ 21UPHA31	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Unit I: Elasticity

Stress, strain, Hooke's law – elastic moduli – work done in shearing strain – Poisson's ratio – relation between elastic constants – twisting couple on a cylindrical wire – expression for couple per unit twist – torsion pendulum – experiment to determine the rigidity modulus of a wire using torsion pendulum.

Unit II: Bending moment

Bending of beams – expression for bending moment – theory of uniform bending – expression for elevation in uniform bending – experiment to find young's modulus using microscope – non-uniform bending – expression for depression – experiment to find young's modulus using scale and telescope.

Unit III: Thermal Physics

Mean free path – expression for mean free path – transport phenomena – expression for viscosity, thermal conductivity and diffusion – thermal conductivity – Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – determination of specific heat capacity of a liquid.

Unit IV: Interference and diffraction

Young's double slit experiment – condition for interference –additional phase difference due to dissimilar reflections – colour of thin film – air wedge –thickness of a wire – Fresnel and Fraunhofer diffraction – plane transmission grating – experiment to find wavelength by normal incidence method – distinction between interference and diffraction bands.

Unit V: Ultrasonics

Properties of ultrasonic–ultrasonic production – Piezoelectric and magnetostriction methods – detection –thermal and Piezoelectric methods –determination of velocity of ultrasonic waves in liquid using acoustic grating – applicationsand uses – SONAR – measurement of velocity of blood flow and movement of heart

Text Book:

1. Ubald Raj A. and Jose Robin G. *Allied Physics I*. Marthandam: Indira publication. 2016.
2. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication. 2006 and 2012.
3. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication. 2004.
4. Dr. Natarajan G. *Engineering Physics – I*. Chennai: Sri Krishna publications. 2004.

Books for Reference:

1. Mathur D. S. *Properties of matter*. Shyamalal charitable trust Ram Nagar. 1992.
2. Murugeshan R. *Properties of matter*. S. Chand & Co. Ltd. 2008.
3. David Halliday, Robert Resnick and Jearl Walker. *Fundamentals of Physics*. John Wiley & Sons Inc.
4. Brijlal and Subramania. *A text book of Optics*. S. Chand & Co.

SEMESTER II			
Allied Physics – Paper II (I B.Sc., Mathematics/ II B.Sc., Chemistry)			
Course Code : 21UPHA21	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits: 3**

Course Objectives:

- To understand the importance of Physics in the development of latest technology and apply them in appropriate situations.
- To learn the physical phenomena such as electrostatics, electromagnetism, relativity, electronics and energy physics through the systematic study of theory and experiments

Unit I: Electrostatics

Coulomb's law – electric field and field intensity – electric field due to point charge – electric dipole – electric flux – gauss law – applications – electric field due to a charged conducting sphere (point inside and point outside) – uniformly charged cylinder (line charge) – electric potential – potential difference – relation connecting electric field and electric potential at a point – equipotential surface.

Unit II: Electromagnetism

Faraday's laws of induction – induced current and charge – self induction – self inductance of torroidal solenoid – determination of self inductance using Rayleigh method – mutual inductance – coefficient of coupling – determination of mutual inductance using B.G.

Unit III: Nuclear Physics

Classification of nucleus – nuclear constituents – properties of nucleus – expression for magnetic moment of nucleus– packing fraction – mass defect and binding energy – binding energy curve – nuclear fission – energy released in nuclear fission – chain reaction – nuclear fusion – nuclear forces – natural radioactivity – laws of radioactive disintegration – the half life period – mean life period .

Unit IV: Relativity and Wave mechanics

Frame of reference – Galilean transformation – postulates – Lorentz transformation – de Broglie's theory of matter waves – de Broglie wavelength – wave function –postulates of quantum mechanics – Schrodinger wave equation – time dependent form.

Unit V: Digital electronics

Binary numbers – conversion of decimal number into binary number – binary to decimal – binary addition – multiplication –subtraction by 2's complement – basic logic gates - OR , AND, NOT, NOR, NAND gates – De Morgan's laws – boolean equations and logic circuit from truth table – NOR and NAND gates as universal building blocks –binary adder – half adder.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication 2012.
2. Murugeshan R. *Modern Physics*. S. Chand & Co. 2011.

Books for Reference:

1. Rai G. D. *Solar energy Utilization*. Khanna Publishers. Seventh reprint, Fifth edition 2008.
2. Brijlal N. And Subramanian. *Electricity & Magnetism*. Ratan Prakashan Mandir. 14th revised Edition. 1985.
3. Tewari K. K. *Electricity and magnetism*. Sultan Chand & Co. Reprint, 2nd edition 1994.
4. Milman and Taub. *Integrated Electronics*. International student edition. (TMH).

Method of Evaluation:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	CL
CO-1	Define coulomb's law Gauss law, Faraday's law, packing fraction, frame of reference and binary numbers, which gives an idea about the electrostatic force between point charges and nuclear force of attraction.	**K1**
CO-2	Discuss electric field. Toroidal solenoid, binding energy, de-Broglie wavelength and addition, subtraction of binary numbers.	**K2**
CO-3	Apply the knowledge gained in electricity, magnetism, nuclear force , frame of reference, binary numbers, to demonstrate about the electric potential, self inductance of a coil and basic logic gates.	**K3**
CO-4	Analyse the estimated values of an electric field due to a charged sphere, mutual inductance of a coil, energy released in nuclear reactions theoretically. Prove that NOR and NAND gates are universal building blocks.	**K4**
CO-5	Evaluate the significance and applications of electricity, magnetism and nuclear force in various fields, examine the structure of various number system and its applications in digital design.	**K5**

Mapping with program outcomes and programme specific outcomes:

Map course outcomes **(CO)** for each course with program outcomes **(PO)** and Programme Specific Outcomes **(PSO)** in the 3-point scale of HIGH (**3, ≥ 70%**), MEDIUM (**2, ≥ 40%** and < **70%**) and LOW (**1, <40%**).

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	3	1	1	1	1	2	1	1	1	1
CO-2	3	2	2	1	2	3	2	1	2	1
CO-3	2	3	3	2	2	2	3	2	3	3
CO-4	1	3	3	3	2	2	3	3	2	3
CO-5	1	2	3	3	3	2	3	3	3	3
Ave.	2	2.2	2.4	2	2	2.2	2.4	2	2	2.2

SEMESTER III			
ALLIED PHYSICS – PAPER I - II B.Sc., Chemistry			
Code : 21UPHA31	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Vision: To enable students to understand and appreciate the principle behind various physical phenomena and apply them in appropriate situations.

Mission: To provide knowledge in the physical phenomena such as elasticity, bending of beams, heat, light and ultrasonic through the systematic study of theory and experiments.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define fundamentals of elasticity and discuss concepts of stress and strain and the relationship between both, use the stress-strain equations to solve the problems of elastic modes	1	**R, U**
CO-2	solve problems related to uniform and non-uniform bending of beams	1	**An**
CO-3	tell about the terms viscosity and surface tension	1	**R**
CO-4	describe the properties of fluids such as viscosity, surface tension and evaluate the value of coefficient of viscosity	1,2,6	**U,E**
CO-5	estimate the thermal conductivity of a bad conductor	1,2,6	**E**
CO-6	calculate the specific heat capacity of a liquid	1,2,6	**An**
CO-7	calculate the thickness of a thin wire by forming interference fringes	1,2,6	**An**
CO-8	evaluate the dispersive power and resolving power of a grating	1,2,6	**E**

Unit I: Elasticity

Stress, strain, Hooke's law – elastic moduli – work done in shearing strain – Poisson's ratio – relation between elastic constants – twisting couple on a cylindrical wire – expression for couple per unit twist – torsion pendulum – experiment to determine the rigidity modulus of a wire using torsion pendulum.

Unit II: Bending moment

Bending of beams – expression for bending moment – theory of uniform bending – expression for elevation in uniform bending – experiment to find young's modulus using microscope – non-uniform bending – expression for depression – experiment to find young's modulus using scale and telescope.

Unit III: Thermal Physics

Mean free path – expression for mean free path – transport phenomena – expression for viscosity, thermal conductivity and diffusion – thermal conductivity – Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – determination of specific heat capacity of a liquid.

Unit IV: Interference and diffraction

Young's double slit experiment – condition for interference – additional phase difference due to dissimilar reflections – colour of thin film – air wedge –thickness of a wire – Fresnel and Fraunhofer diffraction – plane transmission grating – experiment to find wavelength by normal incidence method – distinction between interference and diffraction bands.

Unit V: Ultrasonics

Properties of ultrasonic – ultrasonic production – Piezoelectric and magnetostriction methods – detection –thermal and Piezoelectric methods –determination of velocity of ultrasonic waves in liquid using acoustic grating – applications and uses – SONAR – measurement of velocity of blood flow and movement of heart

Text Book:

1. A. Ubald Raj & G. Jose Robin, Allied Physics I, Indra Publications, Marthandam (July 2016).
2. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications, Marthandam (2006, 2012).
3. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications, Marthandam (April 2004).
4. Dr. G. Natarajan, Engineering Physics – I, Sri Krishna publications, Chennai- 37(July 2004)

Books for Reference:

1. D. S. Mathur, Properties of matter, Shyamalal charitable trust, Ram Nagar, 1992.
2. R. Murugeshan, Properties of matter, S. Chand & Co. Ltd., 2008.
3. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, John Wiley & Sons Inc.
4. Brijlal & Subramanian, A text book of Optics, S. Chand & Co.

UNIT	BOOK	CHAPTER	PAGE NO.
I	T1 T 2	1 3	1 – 26 57 – 85
II	T 1	4	87 – 107
III	T 1	4	128 – 145,
IV	T 3	2	30 – 52
V	T4	1	1.28 – 1.45

SEMESTER II/IV

ALLIED PHYSICS PRACTICALS - I B.Sc., Mathematics / II B.Sc., Chemistry

Code : 21UPHAR1	Hrs/Week: 2	Hrs/ Semester: 30	Credits : 2

Any 12 experiments

1. Measurement of diameter using vernier caliper, screw gauge and travelling microscope.
2. Young's modulus – Uniform bending (pin and microscope)
3. Young's modulus – Non uniform bending (scale and telescope)
4. Coefficient of viscosity – Stoke's method
5. Spectrometer – Determination of μ
6. Air wedge – Thickness of a wire
7. Lee's Disc – Thermal Conductivity of a bad conductor
8. Basic logic gates – OR, AND and NOT
9. Rigidity modulus – Torsion pendulum
10. Newton's law of cooling - Specific heat capacity of liquid
11. Coefficient of viscosity- Burette method
12. Surface Tension – Drop weight method
13. Half Adder
14. De Morgan's law verification
15. Boolean expression verification
16. Spectrometer – Normal Incidence

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SEMESTER- I			
CORE I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objectives:

1. To learn about mechanics and properties of matter
2. To know their relevance in day to day applications.
3. To learn about conservation laws, collisions and gravitational force, elasticity, surface tension and viscous nature of matter.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss the principle of conservation of energy and linear momentum, derive an expression for two body problem, calculate the moment of inertia of diatomic molecule	1	**U**
CO-2	discuss impulse and linear momentum, calculate the change in momentum of an object for the net force acting on the object	1	**U**
CO-3	analyse the motion of the projectile	1	**An**
CO-4	describe about gravitation and calculate the acceleration due to gravity at a place.	2,4,6	**E**
CO-5	describe the fundamental concepts of stress and strain and their relationship through the stress-strain curve, Hooke's law and Poisson's ratio	1	**U**
CO-6	calculate the elastic constant values of materials which is necessary for beam construction.	1	**An**
CO-7	learn about the properties of fluids such as viscosity, surface tension and capillary rise.	1	**U**
CO-8	calculate the properties and utility of lubricants	1	**E**
CO-9	calculate the surface tension of a liquid	2,4,6	**E**

SEMESTER- I			
Core I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Conservation laws:

Newton's laws of Motion- inertial frames – gravitational mass – conservation of linear momentum, conservation of angular momentum –conservation of energy – work energy theorem – conservative force and potential energy – centre of mass of a system of particles – two body problem and reduced mass – moment of inertia of system of diatomic molecules.

Unit II: Collision and Projectiles:

Collision – impulse and linear momentum – elastic and inelastic collision – fundamental principles of impact – direct and indirect impact – velocities and kinetic energy in direct impact – loss of k. e in an indirect impact – transfer of energy in collision between two equal masses – projectile – expression for time of flight and horizontal range of a projectile – path of a projectile – range of a projectile on an inclined plane.

Unit III: Gravitation: Gravitation – Newton's law of gravitation – determination of gravitational constant – Boys' method – gravitational potential and field due to a spherical shell and solid sphere – acceleration due to gravity(g) by compound pendulum – variation of 'g' with altitude and latitude.

Unit IV: Elasticity and bending of beams:

Stress – strain – Hooke's law –relation connecting elastic moduli – Poisson's ratio – twisting couple on a cylindrical wire (torsion) – expression for couple per unit twist – work done in twisting – torsion pendulum – theory – determination of rigidity modulus by dynamic method

– bending of beams – expression for bending moment – uniform and non-uniform bending – theory and experiment – determination of young's modulus – work done in bending – cantilever – expression for depression at the loaded end of a cantilever.

Unit V: Viscosity and Surface Tension:

Streamlined motion – turbulent motion – coefficient of viscosity – rate of flow of liquid in a capillary tube by dimension method and Poiseuille's formula – analogy between liquid flow and current flow – experimental determination of viscosity of a liquid by Stoke's method.

Surface tension – work done in increasing area of the surface – work done in blowing a bubble – variation of surface tension with temperature – experimental determination of surface tension by Jaegar's method – excess of pressure inside a curved liquid surface – excess pressure inside a liquid drop – excess pressure inside a soap bubble.

Text Books:

1. Murugeshan R. *Properties of matter*. S. Chand & Company Ltd. Revised edition 2008.

2. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication

2003.

3. Ubald Raj A. and Jose Robin G. *Mechanics and relativity*. Marthandam: Indira Publications. 2008.

Books for Reference:

1. Mathur D. S. *Mechanics*. S. Chand & Co. Ltd. 1984.

2. Mathur D. S. *Properties of matter*. Ram Nagar: Shyamlal Charitable trust. 1992.

3. Brijlal and Subramanyam N. *Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.

4. Dr. Upadhyaya J.C. *Classical Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.

SEMESTER- II			
CORE II	**Thermal Physics And Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objective:

1. To gain knowledge about the laws of thermodynamics
2. To understand the concept of transport phenomena and thermal conductivity
3. To provide a solid understanding of low temperature physics and optical phenomena
4. To know the spectacular nature of light by studying interference, diffraction and polarisation

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laws of thermodynamics understand the concepts of transport phenomenon	1 1	**U** **U**
CO-2	understand the transfer of energy through conduction, convection and radiation	1	**U**
CO-3	demonstrate the experiment regarding the measurement of thermal conductivity and specific capacity. Calculate the thermal conductivity of a bad conductor	1 2, 4, 6	**U** **E**
CO-4	understand the low temperature physics, concerned with the behaviour of matter in the temperature regime where quantum effects are dominated	1	**U**
CO-5	create an interest in field of research in low temperature physics	1	**C**
CO-6	learn about the dispersion through a prism. determine the refractive index and dispersive power of the material of the prism	1 2, 4, 6	**U** **E**
CO-7	define the different types of aberrations in lenses and discuss the methods to reduce them	1	**R, U**
CO-8	describe the phenomenon of interference and colours of thin films. calculate the thickness of a thin wire by forming interference fringes	1 2, 4, 6	**U** **E**
CO-9	evaluate the dispersive power and resolving power of a grating and demonstrate experiments with a grating and find the wavelengths of the light used	2, 4, 6	**E, An**

CO-10	acquire knowledge of the polarisation of light and its changes upon reflection and transmission	1	**U**

SEMESTER- II			
CORE II	**Thermal Physics And Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Laws of thermodynamics and Transport Phenomena

Zeroth law of thermodynamics – first law of thermodynamics – isothermal change – adiabatic change – heat engine – expression for the efficiency of a Carnot's engine – Carnot's cycle as refrigerator – reversible and irreversible process – second law of thermodynamics — entropy – change in entropy in reversible and irreversible process – temperature-entropy diagram – third law of thermodynamics – mean free path - transport phenomena - expression for the viscosity of a gas – expression for thermal conductivity of a gases – expression for the coefficient of diffusion

Unit II: Transfer of heat and low temperature physics

Conduction, convection and radiation – conduction of heat – Lee's Disc's method of determining K of a bad conductor – convection of heat – Newton's law of cooling by convection –experimental verification of Newton's law of cooling –the Joule Porous plug experiment – relation between inversion, Boyle and critical temperatures – adiabatic demagnetization – theory and experimental setup.

Unit III: Dispersion and Aberrations

Dispersion through a prism – angular dispersion – dispersive power – achromatism in prisms – deviation without dispersion – dispersion without deviation – direct vision spectroscope – constant deviation prism – constant deviation spectroscope – spherical aberration in lenses – methods of minimizing spherical aberration – condition for minimum spherical aberration of two thin lenses separated by a distance – aplanatic lens – chromatic aberration in lenses – condition for achromatism of two thin lenses in contact – coma.

Unit IV: Interference and Diffraction

Interference – conditions for sustained interference – interference by reflected systems – production of colours in thin films– air wedge – determination of diameter of a thin wire by air

wedge – test for optical flatness – Newton's rings – determination of wavelength of sodium light by Newton's rings – determination of refractive index of a liquid by Newton's rings.

Fresnel's diffraction – half period zones – zone plate – multiple foci in a zone plate – comparison of zone plate with a convex lens – Fraunhofer diffraction – plane transmission diffraction grating – grating at normal incidence –determination of wavelength of light by normal incidence method and minimum deviation method– dispersive power of grating – grating at oblique incidence – resolving power of optical instruments – Rayleigh's criterion for resolution – resolving power of a grating.

Unit V: Polarisation

polarisation of light – double refraction – Nicol prism – polarizer and analyzer – quarter wave plate and half wave plate – plane, elliptically and circularly polarized light:production and detection – optical activity – Fresnel's theory of optical activity – experimental verification of Fresnel's theory – specific rotation – Laurent's half shade polarimeter.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication.
2. Murugeshan R. *Thermal Physics and Geometrical Optics*.
3. Murugeshan Kiruthiga Sivaprasath R. *Optics and Spectroscopy*. S. Chand & Company Ltd. Revised edition 2014.

Books for Reference:

1. Gupta B. and Roy H.P. *Thermal Physics*. Books and Allied (P) Ltd., Second edition 2005.
2. Brijlal and Subramanyam N. *Heat and thermodynamics,* S. Chand & Co. Ltd. 2005.
3. Arunabhasen and Gupta A. B. *College Physics.* volume I. Books and Allied (P) Ltd. 2005.
4. Brijlal and Subramanyam N. *Optics*. S. Chand & Co. Revised by M.N. Avadhanulu. 23rd revised edition 2006.

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Objectives:

1. To deal with the basic concept of electricity
2. To discuss the laws of electromagnetic induction
3. To extend the fundamental concepts to AC bridges

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	recall Current	1	Re
CO–2	apply Kirchoff's law to Wheatstone's network	1	Ap
CO–3	apply the principle of potentiometer to measure current and resistance	1	Ap
CO–4	compare self inductance and mutual inductance	1	Ev
CO–5	describe choke coil	1	Un
CO–6	construct LCR series and parallel resonance circuit	1	Cr
CO–7	study the uses of transformer	1	Ap
CO–8	construct De Sauty's bridge and Wein's bridge	1	Cr

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Unit I: Steady Currents and Thermo-Electricity

Current and Current density – Expression for current density –Equation of Continuity – Ohm's law and Electrical Conductivity – Kirchoff's laws – Applications to Wheatstone's network – Carey Foster bridge – Determination of the Temperature coefficient of resistance – Potentiometer: Principle, Calibration of Ammeter, Voltmeter (Low & High range), Measurement of Resistance of a coil with a Potentiometer – Seebeck effect – Law of Thermo emf – Peltier effect – Thomson effect – Thermodynamics of Thermocouple.

Unit II: Magnetic Properties and Magnetostatics

Magnetic induction (B) – Magnetization (M) – Relation between B, H and M – Magnetic susceptibility – Magnetic permeability – Relation connecting them.

Moving coil Ballistic galvanometer: Principle, Construction, Theory – Correction for damping – Measurement of Charge sensitiveness – Absolute capacitance of a capacitor.

Unit III: Electromagnetic Induction

Faraday's laws of induction – Lenz law – Expression for induced current – Self induction – Self inductance of a long solenoid – Determination of self inductance by Rayleigh's method – Self inductance of a toroidal coil of rectangular and circular cross- section – Mutual induction – The Neumann formula for mutual inductance – Mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance- Eddy currents.

Unit IV: Alternating Current

Emf induced in a coil rotating in a magnetic field – A.C circuit containing Resistance, Inductance and Capacitance only – A.C circuit containing L and R in series – A.C circuit containing C and R in series – A.C circuit containing LCR in series – Parallel resonance circuit

– Power in A.C circuit – Choke coil.

Unit V: Transformers and A.C Bridges

Coupled circuit – Transformers – Detailed theory of transformer – Transformer losses

–A.C bridges – A.C bridges for the measurement of inductances: Maxwell's bridge, Owen bridge, Anderson's bridge – A.C bridges for the measurement of capacitance: De Sauty's bridge, Wein's bridge, Schering bridge – Robinson's bridge for determining the frequency of an a.c source.

Text Books:

1. Murugeshan R. *Electricity and Magnetism*. New Delhi: S. Chand & company Ltd.Reprint, 2019.
2. Dr.Tewari K.K. *Electricity and Magnetism with Electronics.* New Delhi: S. Chand & company Ltd. Reprint, 2018.

Books for Reference:

1. Brijlal and Subramanium. *Electricity and Magnetism*. Ratan Prakash mandir. 7th edition 1994.
2. Tayal D.C. *Electricity and Magnetism*. Himalaya Publishing House. 3rd revised edition 1998.

David Halliday, Robert Resnick and Jearl Walker. *Fundamentals of Physics.* Wiley & Sons Inc. 6th edition 2006.

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

1. To develop competent technocrats who can strive continuously in pursuit of professional excellence in the field of Electronics and Communication
2. To establish a unique learning environment to enable the students to face the challenges in Electronics and Communication Engineering field
3. To facilitate an understanding of circuit analysis, transistors and op amp

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall semiconductors	2	Re
CO –2	construct a universal divider bias.	2, 4	Cr
CO –3	construct inverting and non inverting amplifier.	2, 4	Cr
CO –4	design a difference amplifier	2, 4	Cr
CO –5	list out the types of networks	2	Re
CO –6	prove thevenin's and norton's theorem	2, 4	An
CO –7	describe amplitude modulation	2	Un
CO –8	understand the principle of amplitude modulation reception	2	Ap

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I: Linear Circuit Analysis

Linear and non–linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h-parameters.

Unit II: Transistors

Function Transistor – Transistor Action – Relation connecting Alpha and Beta of a transistor – Three modes of transistor connection – Relation between alpha, beta and gamma – Current components in a transistor and relation connecting I_c and I_b – Load line, Q point, biasing and stabilization – Methods of transistor biasing – Fixed bias or base bias circuit – Collector feedback bias – Universal divider bias.

Unit III: Operational Amplifiers

Operation of Differential amplifier – CMRR – Important Characteristics – Slew Rate – Inverting amplifier – Non inverting amplifier – Gain – Voltage follower – Multistage op-amp circuits – Summing amplifier – Difference amplifier – Integrator and Differentiator using op-amp.

Unit IV: Amplitude Modulation and Transmission

Introduction – Elements of a communication system – Noise – Signal to Noise ratio – Noise figure – Modulation – Need for modulation – Different kinds of modulation – Bandwidth required for transmission – Amplitude modulation – Wave forms, side bands and power – Transmission of Radio waves: AM Transmitter – Broadcast AM Transmitter – High level AM Transmitter – Low level AM Transmitter.

Unit V: Amplitude Modulation - Reception

Radio Amplitude modulation – Comparison of AM Systems – Quadrature Amplitude Modulation (QAM) – Generation of QAM signal – AM Receivers – Demodulation (AM Detection) : Envelope detector – Tuned Radio Frequency (TRF) Receiver (Straight Receiver) – Super heterodyne receiver – Characteristics of a receiver (Receiver parameters) – Choice of Intermediate frequency for heterodyne receiver – Communication receiver: Double frequency conversion A.M receiver.

Text Books:

1. Jose Robin G and Ubald Raj A. *Electronics*. Marthandam: Indira Publication, First Edition 2000.

Books for Reference:

1. Jose Robin G and Ubald Raj A. *Communication Electronics*. Marthandam: Indira Publications. First Edition 2002.
2. Bargava N. N, Kulshreshtha D. C. and Gupta S. C. *Basic Electronics and linear circuits*. New Delhi: Tata McGraw Hill Publishing company Ltd. Reprint, 2012.

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Objectives:

1. To prepare the students for competitive exams and make them competent in facing the challenges with confidence
2. To motivate students to face and pursue higher education through competitive Examinations
3. To equip students with the basic principles of physics and apply the same in solving problems

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	solve problems in gravitation and escape velocity	8, 9	An
CO –2	answer problems in surface tension and viscosity	8, 9	An
CO –4	explain problems in laws of thermodynamics	8, 9	An
CO –5	solve problems in diffraction and interference	8, 9	An
CO –6	explain problems related to kirchhoff's laws & steady current	8, 9	An
CO –7	explain problems in electromagnetic induction	8, 9	An
CO –8	solve problems in zener diode & transistor	8, 9	An

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Unit I: Properties of matter

Gravitation, Escape velocity and artificial satellite – Surface Tension and Viscosity – Elasticity.

Unit II: Heat

Laws of thermodynamics - Conduction and radiation.

Unit III: Optics

Interference – Diffraction, Resolving power (Prism & Grating) and Polarisation.

Unit IV: Electricity and Electromagnetism

Kirchhoff's laws and Steady current – Electromagnetic Induction - Alternating Current.

Unit V: Semiconductors

PN junction diode – Zener diode – Transistor: Transistor as an amplifier, Transistor as an oscillator.

Text Books:

1. Dr. Kakani S.L. *Objective Physics*. Sultan Chand and sons Ltd. 10th revised edition 2001.

Book for Reference:

1. Satya Prakash and Er. Vibhav Saluja. *Objective Physics*. Meerut: Prakashan publications. 27th revised edition 2010.

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

(Compulsory)

Objectives:

1. To know the students how to apply the electronic components in physics laboratory
2. To make the students to measure the physical quantities using measuring instruments
3. To enhance the students to know about photography

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe different types of capacitors	10	Un
CO –2	define the method of soldering	10	Re
CO –3	compare audio frequency range and radio frequency bands	10	An
CO –4	usage of transducers	10	Ap
CO –5	define aperture of camera	10	Re
CO –6	construct the parts of camera	10	Cr
CO –7	define the terms of film structure and film speed	10	Re
CO –8	identify the types of filters used in photography	10	Un

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

Unit I: Electronic Components

Active and passive components – Resistances - Capacitors: Uses, Types of capacitors, Detecting faulty capacitors, Characteristics, Working Voltage – Soldering techniques – Groove board – Bread board – Printed circuit board.

Unit II: Measuring Instruments

Multimeter – Cathode Ray Oscilloscope – Liquid Crystal Display – Audio Frequency Oscillator.

Unit III: Transducers

Transducer: Classification, Basic requirements – Inductive transducer – Piezoelectric transducer – Capacitive transducer – Resistive transducer: Potentiomentric type, Wheatstone bridge type.

Unit IV: Photography I

Camera – Photographic camera – Parts and their functions – Camera lens: Types – Camera lens shutters: Types.

Unit V: Photography II

Film structure – Film speed – Exposure triangle – Flash photography - Camera lens filter – DSLR camera – Digital format in DSLR camera.

Text Book:

1. Jose Robin G and Ubald Raj A. *Maintenance of Electronic Equipment & Photography*. Marthandam: Indira Publications. First Edition 2017.