



**Annai Hajira Women's College**  
**Melapalayam, Tirumelveli-05**

**DEPARTMENT OF PHYSICS**

**Syllabus 2021-2022**

**POs, PSOs & COs of Physics**

**UG-Programme – CBCS –SEMESTER PATTERN**

**Course Code: 1522**



**Department of  
Physics**

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**UG -Programme - Course Structure under CBCS**  
**B.Sc – Physics**  
**(Effective from the academic year 2021- 2022 onwards)**  
**FIRST SEMESTER**

Sub Code	Subject Title	Lecture Hours	Lab Hours	Credits
C1TL11	Part –I Language	6	---	4
C2EN11	Part –II Communicative English I	6	---	4
CMPH11	Part III Core 1: Properties of Matter and Mechanics	4	---	4
CPPS11	Part III Add on Major: Professional English for Physical Sciences I	4	---	4
CMPHP1	Practical I	---	2	2
CAPH11	Allied Physics paper I	4	---	4
CAPHP1	Allied Practical I	---	2	2
CEVS11	Part IV: Environmental Studies	2	---	2
Total	(6T + 2P Courses)	26	4	26

**SECOND SEMESTER**

Sub – Code	Subject Title	Lecture Hours	Lab Hours	Credits
C1TL21	Part –I Language	6	---	4
C2EN21	Part –II English	6	---	4
CMPH21	Part III Core 2: Optics and Acoustics	4	---	4
CPPS21	Add on Major: Professional English for Physical Sciences II	4	---	4
CMPHP2	Major Practical II	---	2	2
CAPH21	Allied Physics paper II	4	---	4
CAPHP2	Allied Practical II	---	2	2
CVBE21	Part IV: Value Based Education	2	---	2
Total	(6T + 2P Courses)	26	4	26

### THIRD SEMESTER

Sub Code	Subject Title	Lecture Hours	Lab Hours	Credits
C1TL31	Part –I Language	6	---	4
C2EN31	Part –II English	6	---	4
CMPH31	Part III Core 3: Electricity and Electromagnetism	4	---	4
CMPHP3	Major Practical III	---	2	2
CAPH11	Allied Physics paper I	4	---	3
CAPHP1	Allied Practical I	---	2	2
CSPH31	Skill Based Subject: (a) Maintenance of Electrical appliances	4	---	4
CSPH32	(b) Instrumentation Physics –I			
CNPH31	Non-Major Elective: (a) Basic Physics I	2	---	2
CNPH32	(b) Applied Physics			
CYOG31	Part IV: Yoga	2	---	2
Total	(7T + 2P Courses)	28	4	27

### FOURTH SEMESTER

Sub Code	Subject Title	Lecture Hours	Lab Hours	Credits
C1TL41	Part –I Language	6	---	4
C2EN41	Part –II English	6	---	4
CMPH41	Part III Core 4: Heat and Thermodynamics	4	---	4
CMPHP4	Major Practical IV	---	2	2
CAPH21	Allied Physics paper I	4	---	3
CAPHP2	Allied Practical I	---	2	2
CSPH41	Skill Based Subject: (a) Maintenance of Electronic equipment's	4	---	4
CSPH42	(b) Instrumentation Physics -II			
CNPH41	Non-Major Elective: (a) Basic Physics II	2	---	2
CNPH42	(b) Space Physics			
CCDE41	Part IV: Computer for digital era	2	---	2
	Part V: Extension activity	---	---	1
Total	(7T + 2P Courses)	28	4	28

### FIFTH SEMESTER

Sub Code	Subject Title	Lecture Hours	LAB Hours	Credits
CMPH51	Part III Core 5: Basic Electronics	6	---	4
CMPH52	Part III Core 6: Spectroscopy	5	---	4
CMPH53	Part III Core 7: Atomic and Nuclear Physics	6	---	4
CEPH51	Part III Core Elective 8: (a) Programming in C++	5	---	4
CEPH52	(b) Communication Electronics			
CMPHP5	Practical V: General practical	---	3	3
CMPHP6	Practical VI: Electronics	---	3	3
CCSB51	Part IV: Common Personality Development	2	---	2
Total	(5T+2P Courses)	24	6	24

### SIXTH SEMESTER

Sub Code	Subject Title	Lecture Hours	LAB Hours	Credits
CMPH61	Part III Core 9: Quantum Mechanics	5	---	4
CMPH62	Part III Core 10: Digital Electronics	5	---	4
CMPH63	Part III Core 11: Solid State Physics	5	---	4
CEPH61	Part III Core Elective 16: (a) Energy Physics	5	---	4
CEPH62	(b) Medical Physics			
	Project	4	---	4
CMPHP7	Practical VII: General Practical	---	3	3
CMPHP8	Practical VIII: Electronics	---	3	3
Total	(4T+2P+1 Project Courses)	24	6	26

## Programme Outcomes

Upon completion of B.Sc degree programme, the graduates will be able to

Programme Outcomes	
PO.1	Acquire a fundamental concept in the field of Physics and procedural knowledge that creates different types of professionals related to the subject area of Physics, including professionals engaged in research and development, teaching and government / public service.
PO.2	demonstrate the ability to use skills in Physics and its related areas of technologies for formulating and tackling Physics related problems.
PO.3	inculcate innovative skills and teamwork among students to meet societal expectations.
PO.4	perform analysis to assess, interpret and create innovative ideas through practical experiments.
PO.5	facilitate to enter multidisciplinary path to solve day-to-day scientific problems.
PO.6	carry out fieldworks and projects both independently and collaboration with others and to report in a constructive way.
PO.7	improve communication ability and knowledge transfer through ICT aided learning integrated with Library resources.
PO.8	attain competency in job market / entrepreneurship.

## Program Specific outcomes

The student graduating with the degree B.sc (Physics) should be able to	
PSO1	Understand and experiment the basic concepts of Properties of Matter and Mechanics, Optics and Acoustics, Heat and Thermodynamics, Electricity and Electromagnetism, Instrumentation Physics, Space Physics, Basic Electronics, Spectroscopy, Atomic and Nuclear Physics, Communication Electronics, Quantum Mechanics, Digital Electronics, Solid State Physics, Energy Physics and Medical Physics.
PSO2	Develop the skills on scientific programming through programming with C++ which will make them choose their career in wide spectrum of areas.
PSO3	Students will have knowledge about the working of medical instruments, laser, super conductivity, electrical appliances, wiring and nano materials.
PSO4	Students utilize their laboratory skills to take measurements in Physics laboratory, analyze the measurements and draw valid conclusions.
PSO5	Students will be able to compile oral and written scientific communications and will prove that they can think critically and work independently.
PSO6	Harness the scientific ideas to reduce pollution by promoting non-conventional and renewable energy sources.
PSO7	Students will illustrate proficiency in mathematics and the mathematical concepts needed for the proper understanding of physics and can face competitive exams with ease.
PSO8	Gain confidence and move to higher studies.

I B.Sc Physics - First Semester

Core-1: PROPERTIES OF MATTER & MECHANICS

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define Stress, Strain, Poisson's ratio, Hooke's law, Torsion pendulum and determine the elastic constant by Searle's Method.	1	Re, Ap
CO-2	Understand the principle of elasticity through the study of young's Modulus and Rigidity Modulus.	1	Un
CO-3	Derive the Expression for the Bending Moment, Cantilever depression, Uniform and Non-Uniform Bending.	1,4	An
CO-4	Find the Young's Modulus of a bar by Uniform and Non-Uniform Bending Method.	1,3,4	Ca
CO-5	Analyse the different Molecular Forces that causes tension on the surface of liquid and determine the surface tension by Capillary rise method and Quincke's Method	3,4	An, Ev
CO-6	Determine the Coefficient of Viscosity of a liquid by Poiseuille's Method and apply the knowledge of viscosity in the field of lubrication	4	Ca, Un, Ap
CO-7	Understand the Analogy between translational and Rotational Motion, Angular Momentum, Angular Impulse, Moment of Inertia and Radius of gyration	1	Un
CO-8	Understand Newton's Second Law for rotation and determine the expression for rotational kinetic energy and power during rotation.	1	Un, E
CO-9	Analyse the centre of pressure on a rectangular and triangular lamina.	1	A
CO-10	Understand the law of floatation and determine the Metacentric height of a ship and apply the principle of Bernoulli's Theorem in Pitot's tube and Venturimeter	1	Un, Ap

I B.Sc Mathematics and II B.Sc Chemistry

First Semester and Third Semester

ALLIED PHYSICS- I

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define the fundamentals of elasticity, concept of stress, strain, bending moment and to solve the problems related.	1	Re, Ap
CO-2	Understand the principles of elasticity through the study of Young Modulus and modulus of rigidity.	1,4	Un
CO-3	Understand principles of surface tension and Viscosity	1	Un
CO-4	Describe the properties of fluids such as viscosity and surface tension and evaluate the value of coefficient of viscosity	1,3,4	An, Ev
CO-5	Explain the phenomena of simple harmonic motion and the properties of systems executing such motions.	1,4	An, Ev
CO-6	Determine the frequency of tuning fork by Melde's string experiment and apply the knowledge of simple harmonic motion.	1,3,4	Ca, Un, Ap
CO-7	Understand the laws of thermodynamics, concepts of transport phenomena.	1	Un
CO-8	Demonstrate the experiments to determine the thermal conductivity and specific heat capacity and apply the knowledge of transport phenomena.	1,4	An, E, Ap
CO-9	Acquire mastery of the fundamental principles and applications of interference, diffraction and polarization	1	Ac
CO-10	Demonstrate the experiments to find the wavelength of different colours of light by normal incidence using grating and apply the knowledge of diffraction principle.	1,3,4	An, Ap

I B.Sc Physics - Second Semester

Core-2: OPTICS AND ACOUSTICS

Course Outcome:

CO. No.	After completion of this course, students will be able to	PSO addressed	CL
CO-1	Understand the concepts of spherical aberration, chromatic aberration in lenses, refraction, deviation and dispersive power of a prism.	1	Un
CO-2	Acquire knowledge of the working principle of constant deviation spectroscope and different types of eyepieces.	1	Un
CO-3	Discuss the theory of interference fringes and interference in thin films	1, 7	Un
CO-4	Apply the phenomenon of interference on optical Experiments like air wedge, Newton's rings and Michelson's interferometer.	1,4	Ap
CO-5	Define diffraction, polarization, double refraction and optical activity	1	Re
CO-6	Understand the theory of diffraction by a single slit, diffraction by a circular aperture, theory of grating and theory of different types of polarized light.	1, 7	Un
CO-7	Acquire knowledge of simple harmonic motion, damped and forced vibrations, musical notes and musical scale.	1	Un
CO-8	Describe the principle and working of acoustic instruments like Helmholtz resonator, sonometer and Melde's apparatus.	1, 4	Un, Ev
CO-9	Understand the properties, applications, production and detection of ultrasonic waves	1	Un
CO-10	Derive Sabine's formula and apply it to design the acoustically good auditorium and architectures.	1, 7	Cr

I B.Sc Mathematics and II B.Sc Chemistry

Second Semester and Fourth Semester

ALLIED PHYSICS - II

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Apply Ohm's Law and construct the resistors in series & parallel	3	Ap
CO-2	Analyse the conversion of Galvanometer into Ammeter and Voltmeter	2	Cr
CO-3	Analyse the properties of magnetism and to classify the Dia, Para and Ferromagnetic materials	2	U
CO-4	Analyse Faraday's Law of Electromagnetic Induction and to determine the mutual induction using BG	2	An
CO-5	Identify and analyse the uses of junction diodes and to analyse the characterization of Zener diode and transistors	2	Re
CO-6	Evaluate the basic logic gates such as NAND, NOR, EX-OR, and to prove De-Morgan's Law	2	Ev
CO-7	Analyse the classification of nuclei and the properties of nucleus	3	Ap
CO-8	Analyse and apply the fundamental laws of radioactivity	2	Ev
CO-9	Demonstrate the projectiles and to calculate the time of flight	1	U
CO-10	Analyse and apply Galilean and Lorentz transformation equations	3	Ap

## II B.Sc Physics Third Semester

### Core 3: ELECTRICITY & ELCTROMAGNETISM

#### Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Class level (CL)
CO-1	Understand the basics and applications of Coulomb's law, Gauss' law and thermoelectric effects	1	Un, Ap
CO-2	Explain the Kohlrausch's bridge method for determining the specific conductivity of an electrolyte.	1, 4	Ex, Ca
CO-3	Understand Ohm's law, Kirchoff's laws, growth and decay of current and charge in different circuits.	1	Un, Ap, Ev,
CO-4	Analyse LCR series resonance and LCR parallel resonance circuits with derivation.	1, 7, 8	An, Ev
CO-5	Understand the about magnetic vectors, B-H curve and Lorentz force.	1	Un, Rp
CO-6	Explain the construction, working and application of moving coil Ballistic galvanometer and DeSauty's bridge.	1, 4, 8	Ex, Ap, An
CO-7	Understand the concepts of Faraday's laws, Owen's bridge and coefficient of coupling.	1, 7	Un, Rp
CO-8	Use of Earth inductor for finding horizontal component and vertical component of the Earth's magnetic field	4, 7	Ap, Ca
CO-9	Derive the Maxwell's equations for material medium and for free space.	1, 8	Un, An
CO-10	Explain the concepts of Hertz experiment for production and detection of EM waves and to understand Poynting vector and displacement current.	1, 4, 8	Ex, Un, Cr

## SKILL BASED ELECTIVE

### 1 a. MAINTANANCE OF ELECTRICAL APPLIANCES

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able To	PSO addressed	CL
CO - 1	Understand the operations and safe handling of commonly used domestic appliances.	1	U
CO - 2	Understand the basic ideas about the components used in electrical appliances.	1	U
CO - 3	Understand a basic knowledge of electricity and magnetism.	1	U
CO - 4	Understand and apply knowledge to design and troubleshoot the electrical circuits.	1, 3	U, Ap
CO - 5	Understand the basic ideas about transformers and their types and working principles.	1, 4	U, An
CO - 6	Understand the concepts underlying the operation of AC and DC circuits.	1, 3	U
CO - 7	Describe the concept of household circuits and their wiring systems in detail.	1, 4	U, An
CO - 8	Understand the earthing and colour coding of the wires	1, 3	U
CO - 9	Managing the appliances with safety precautions using switches and fuses.	1, 3	U, Ap
CO - 10	Understand the basic ideas behind inverters, motors, and generators.	1, 3	U

### Skill Based 1.b : INSTRUMENTATION PHYSICS - I

**Course Outcome:**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Name the Physical quantities and define its use.	1	Re
CO-2	Recall and recognize the units of physical quantities	1	Un
CO-3	Compare the different types of errors Differentiate average & standard deviation	1,2	Un, Ap
CO-4	Calculate arithmetic mean & its deviation	2	Ap
CO-5	Classify the electrode materials & differentiate them	3,8	An, Ap
CO-6	Design the forms of electrodes	4	Cr
CO-7	Recall instruments used commonly in medical field Identify the instrument	1,8	Un
CO-8	Compare digital & analog instruments Distinguish EEG& ECG	7	Ap, An
CO-9	Classify the types of displays Design a simple circuit using LED	3,4	Un, Cr
CO-10	Infer the use of LCD. Explain incandescent display.	5	Un, Ev

**II B.Sc. Computer Science Third Semester**

**NON MAJOR ELECTIVE**

**PAPER 1.a / BASIC PHYSICS-I**

**Course Outcome:**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Recall the definition of speed, velocity and acceleration	1	Re
CO-2	Apply the principle of work, power and energy in any onedaily activity.	3	Ap
CO-3	List out the applications of Bernouille's theorem	3	Ap
CO-4	Analyse the functioning of a venturimeter and Pitot's tube	7	An
CO-5	Summarize the effect of reverberation in buildings	1	Un
CO-6	Create a method to produce and detect plane polarized light	7	Cr
CO-7	Enumerate the different types of resistances	1	Un
CO-8	Construct Wheatstone's bridge using Kirchoff's law	7	Cr

**NON MAJOR ELECTIVE**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Explain about the conventional energy sources	1,7	Re,Un
CO-2	Illustrate about the world's reserve of conventional energy.To classify various forms of energy.	1	Un,An
CO-3	Summarize about fossil fuels such as coal, oil and naturalgas and their availability, statistical details.	1	Re,Ev
CO-4	Explain about fossil fuel's application and to list out themerits and demerits.	1,6	An
CO-5	Illustrate about Bio mass energy and Biomass classificationand to elaborate the Bio Mass Conversion process	1,5	Re,An
CO-6	Summarize about Dheena Bandhu Model gas plant. They can explain the importance of wood gasification, Also, to list out the merits and demerits of Bio Mass	1,5	Un,Ev
CO-7	Demonstrate about the renewable energy resources Such assolar energy and their applications	1,6	Re
CO-8	Elaborate about solar pond, solar water heater, solarcookers, solar green house and solar cell	1,3	Un,An
CO-9	Illustrate about Geothermal energy and Geo thermal power plant. Summarize about the wind energy, wind farms and wind mill.	1,3	Re,Un
CO-10	Explain the process of producing energy from tides andenergy from waves	1,3	Re

**PAPER 1.b /APPLIED PHYSICS**

**Course Outcome:**

**II B.Sc Physics Fourth Semester**

**Core 4: Heat and thermodynamics**

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Class level (CL)
CO-1	Acquire the knowledge of Joule-Kelvin effect, liquefaction of hydrogen and helium gases and adiabatic demagnetization.	1	Ap, Un
CO-2	the practical applications of the low temperature concepts to refrigerator, air-conditioning machine and super fluidity.	1, 3	Ap, Ex
CO-3	Derive the expressions for pressure, gas laws, Maxwell's law of distribution of molecular velocities, viscosity and thermal conductivity.	1, 7, 8	Un, Rp, Ap
CO-4	Derive and determine the Vander Wall's constants and critical constants.	1, 7	Rp, Un
CO-5	Explain the heat experiments like Forbe's method and Lee's disc method for finding thermal conductivity.	1, 4	Ex, Ap, Ca
CO-6	Understand the concepts of black body radiation, Wien's law, Stefan's law and Newton's law of cooling.	1, 8	Un, Ap
CO-7	Acquire the knowledge of Zeroth law, I and II law of thermodynamics, gas equation and Carnot's theorem.	1, 7	Ap, Rp, Ex
CO-8	Apply the laws of thermodynamics to Carnot's engine, Otto engine and Diesel engine to find efficiency.	1, 7	Ap, Un, Ca
CO-9	Derive the Clausius-Clapeyron equation and second latent heat equation and specific heat relation.	1, 8	Un, Ex
CO-10	Understand the concepts of III law of thermodynamics, entropy and to derive Maxwell's thermo dynamical relations.	1, 7, 8	Un, Ap, Ex

**SKILL BASED ELECTIVE**  
**(Any one) PAPER 2.a**  
**MAINTANANCE OF ELECTRONIC APPLIANCES**

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Understand the basic ideas about the components we use in electronic appliances.	1	U
CO - 2	Recognize resistors, capacitors, and connection systems.	1, 3	U, C
CO - 3	Understand the fundamentals of measuring instruments.	1, 4	U, An
CO - 4	Understand oscilloscopes and their various types.	1, 3	U, An
CO - 5	Understand the classification of active and passive transducers and their types.	1	U, C
CO - 6	Understand about the transducer's applications, merits, and demerits.	1	U, Ap
CO - 7	Understand the basic concepts of communication devices and their working principles.	1, 5	U
CO - 8	Understand the principles of operation of modern technology communication devices.	1, 5	U
CO - 9	Learn about photography by using cameras and their accessories.	1, 3, 4	U, An
CO - 10	Learn about shutter speed, resolution, filters, and the use of various lenses in cameras.	1, 4	U, An

**SKILL BASED ELECTIVE**  
(Any one)  
**PAPER 2.b Instrumentation Physics II**

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Recall the use of multimeters. Compare the analog & digital technique	1,2	Re, Un
CO-2	Deduct the use of measurements of frequency & timeinterval	2,4	Ev
CO-3	Categorize the various types of transducers. Make use of experiments using them	3,8	An, Ap
CO-4	Conclude the various uses of transducers	5	Ev
CO-5	Compare optical & electron microscope Define their uses	1,2	An, Re
CO-6	Conclude the uses of SEM & TEM	5	Ev
CO-7	Identify the X- Ray pattern. Relate fluoroscopy & radiography	2,5	Re, Cr
CO-8	Experiment with computers in medicine	4	Ap
CO-9	Explain Oscilloscope and List their uses	1	Un, An
CO-10	Formulate the features of CRT	5	Cr

**II B.Sc Computer Science Fourth Semester**  
**NON MAJOR ELECTIVE**  
**PAPER 2.a / BASIC PHYSICS-II**

**Course Outcome:**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Recall the structure of nuclei	1	Re
CO-2	Explain the properties of alpha, beta and gamma rays	1	Un
CO-3	Enumerate the applications of para, dia and diamagnetic materials	7	Ap
CO-4	Analyse the role of superconductors in the present technology	3	An
CO-5	Weigh the use of Laser technology in medicinal field	7	Ev
CO-6	Explain the postulates of special theory of relativity	7	Cr
CO-7	Differentiate between analog and digital circuits	3	An
CO-8	Design a logic circuit for the addition of two binarynumbers	7	Cr

**NON-MAJOR ELECTIVE  
PAPER 2.b / SPACE PHYSICS**

**Course Outcome:**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Explain about universe planets. Also, to imagine and classify interior and exterior planets	1	Re,Un,Ev
CO-2	Illustrate about Van Allen Belts and to summarize about aurora	1	Re,Un,Ev
CO-3	Classify and illustrate about comets, Meteors, Asteroids	1,5	Re,An
CO-4	Elaborate the salient features of asteroids, meteors and its uses.	1,5	Re,An
CO-5	Describe about sun. To list out the structure of photosphere, chromosphere, Corona.	1	Un
CO-6	Elaborate the satellites of planets their structure. Interpret the phases and features of moon	1	Un,Ev
CO-7	Explain about star constellation. Also, to discuss about binary stars and their origin.	1	Un
CO-8	Classify the types of clusters, types of variables, types of galaxies.	1	Un,An
CO-9	Summarize the origin of universe.	1	Un,An
CO-10	Illustrate about the Big Bang Theory, Pulsating Theory, Steady state theory.	1	Re,Un

**III B.Sc Physics Fifth Semester  
Core 5: Basic Electronics**

**Course Outcome:**

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Differentiate between constant voltage source and constant current source	3	An
CO-2	Explain Norton's theorem and Thevenin's theorem	1	Un
CO-3	Design a voltage regulator using Zener diode	7	Cr
CO-4	Construct a half wave bridge rectifier using diodes and capacitors	7	Cr
CO-5	Explain the forward bias and reverse bias action of a transistor	1	Un
CO-6	Analyse the circuit of a stable and mono stable multi vibrator	3	An
CO-7	Explain the working of a Hartley and Colpitts Oscillator	1	Un
CO-8	Design the circuit for low and high pass filter and explain the frequency response curve	7	Cr

## Core 6 : SPECTROSCOPY

### Course Outcomes

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Explain different types of motion. Classify molecules according to rotational modes.	1,2	Un, An
CO-2	Discriminate the effect of isotopic substitution	5	An
CO-3	Discuss the 3 IR regions. Justify the interaction of rotations & vibrations on molecules.	1,8	Ev, Un
CO-4	Analyzed the IR techniques & explain its importance in research	1,4	An, Cr
CO-5	Distinguish Rayleigh & Raman scattering Categorize classical & quantum theory of Raman effect	2	An
CO-6	Validate the rule of mutual exclusion	5,8	Ev
CO-7	Formulate Lambert- Beer Law & Calculate transmission from absorbance	5,7	Cr, An
CO-8	Relate the use of UV spectrum in research	8	Ap
CO-9	Explain magnetic resonance & its principles.	1	Un
CO-10	List the uses of MRI Interpret NMR spectra	1,5	Re, Ap

## Core 7: Atomic and Nuclear Physics

### Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Class level (CL)
CO-1	Understand the concepts of free electron theory, band theory and positive rays.	1	Un, Ap, Ex
CO-2	Derive the expressions for electrical conductivity, thermal conductivity and to explain Hall effect and Hall coefficient.	1	Ex, Ca, Un
CO-3	Explain the vector atom model, coupling schemes Zeeman effect	1	Ex, Ap, Un
CO-4	Analyse the Stern and Gerlach experiment with derivation.	3, 4	An, Ap, Ca
CO-5	Understand the production, properties, usage of X-rays and various X-ray diffraction methods.	3,4	Un, Ap
CO-6	Explain the basics of primary and secondary cosmic rays, cosmic ray shower and Van Allen belts.	1	Ex, Ap, Un
CO-7	Explain the general properties of nucleus by using liquid drop model and shell model and to understand laws of radioactivity.	1, 7	Ca, Un, Rp
CO-8	Explain the construction, working and application of G.M. counter, Wilson cloud chamber, Cyclotron and betatron.	3	Ex, Ap, Un
CO-9	Apply the concepts of nuclear fission and fusion to atom bomb and hydrogen bomb.	1, 8	Ap, Cr, Ex
CO-10	Classify the elementary particles with examples and understand the concept of quark model.	1, 8	Un, Rp, Ap

## MAJOR ELECTIVE (any one)

### a.PROGRAMMING IN C++

#### Course Outcomes

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Understand the basics of C++ programming.	1	U
CO - 2	Understand the applications of C++ modules.	1, 2	U, Ap
CO - 3	Understand the basic techniques of numerical analysis.	1, 2, 7	U, C
CO - 4	Understand and apply computational techniques to physical problems.	1, 7	U, Ap
CO - 5	Understand the procedural and object-oriented paradigms with concepts like streams, classes, functions, and arrays.	1, 2, 8	U
CO - 6	Understand dynamic memory management techniques using member functions, classes, constructors, etc.	1, 8	U, C
CO - 7	Understand the concept of function overloading and operator overloading.	1	U, C
CO - 8	Understand inheritance and its types of inheritance.	1, 8	U, C
CO - 9	Managing the C++ streams with operations and classes	1, 2	U, Ap
CO - 10	Understand the fundamental C++ file operations for single and multiple files.	1, 2	U, Ap

## MAJOR ELECTIVE – b. COMMUNICATION ELECTRONICS

Course outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Analyse amplitude modulation and AM envelope. To explain AM frequency bandwidth and phasor representation of AM with carrier. To determine the coefficient of modulation or percentage modulation or modulation index.	1,4	Un, An
CO - 2	illustrate AM power distribution and AM current relation and efficiency. Elaborate emitter modulations or low power AM collector modulator. Classify low level transmitter and high level transmitter	1	An
CO - 3	Analyze the comparison of AM system and Quadrature amplitude modulation. To illustrate the Principles of AM detection and AM receivers	1,5	Re,An
CO - 4	Explain about tuned radio frequency receiver or straight receiver. To elaborate double frequency conversion AM receiver.	1	Re,Ev
CO - 5	Illustrate Frequency modulation and phase modulation. To determine phase modulation demodulation index.	4,5	Re,Un
CO - 6	Elaborate the conversion of FM to PM and they can picturize the phasor representation of FM and PM. To compare AM and FM	1	Ev
CO - 7	Explain and Analyze FM detectors and balanced slope detector	4	An
CO - 8	Illustrate the ratio detector and to elaborate the important features of FM super heterodyne receiver and FM noise suppression. Also, to summarize about threshold extension by FMFB technique	5	An,Un
CO - 9	Elaborate about BFSK and to summarize about Binary phase shifting Key. The importance of Quadrature PSK and Differential PSK.	1,5	An,Un
CO - 10	Comparison of digital modulations can be done. to compare and classify correlative coding and Duo binary encoding.	1,4	Un,Ap

### III B.Sc Physics Sixth Semester

#### Core 9: Quantum Mechanics

#### Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Class level (CL)
CO-1	Understand the quantum concepts of black body radiation, Planck's theory and photoelectric effect.	1	Un, Rp, Ex
CO-2	Apply the Bohr's quantization concept of angular momentum to hydrogen atom.	1, 7	Ap, Ca
CO-3	Acquire the knowledge of De Broglie's hypothesis and concepts of phase and group velocities.	1, 8	Rp, Ap
CO-4	Explain the concepts of diffraction and interference of electrons and wave packet	1	Ex, Cr
CO-5	Understand the Heisenberg's uncertainty principle and its proof between energy and time.	1, 7	Un, Ex
CO-6	Demonstrate some thought experiments to explain the Heisenberg's uncertainty principle.	1, 4, 8	Ex, Ap
CO-7	Derive Schrodinger's time-dependent and time-independent wave equations.	1, 7	Ap, Un
CO-8	Understand the concepts of wave function, eigenfunction, eigen value, operators and postulates of quantum mechanics.	1	Un, Ca, Ex
CO-9	Apply the concepts of quantum mechanics to particle in one-dimensional box and particle in rectangular three-dimensional box	1, 7	Ap, Ca, An
CO-10	Acquire knowledge of application of quantum mechanics to simple harmonic oscillator and transmission across a potential barrier.	1, 8	Ap, Ev, Un

### Core 10: Digital Electronics

#### Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define binary number	1	Re
CO-2	Differentiate the various codes in Binary system	3	An
CO-3	Construct the circuit for the basic logic gates	3	Cr
CO-4	Explain the half and full subtractor using logic gates	1	Un
CO-5	Draw the circuit for frequency divider	1	Un
CO-6	Analyse the circuit of astable and monostable multivibrator	3	An
CO-7	Explain the function of a multiplexer and Demultiplexer	1	Un
CO-8	Differentiate A/d and D/A converter	3	An

### Core 11: Solid State Physics

#### Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Explain the seven classes of crystals and to illustrate about the Bravais lattice in three dimensions.	1	Re,An
CO-2	Imagine and elaborate about Simple cubic, Face centered cubic, Body centered cubic and Hexagonal closed packed structures. To make use of Bragg's law and reciprocal lattice to SCC, BCC and FCC lattices.	1,3	Un,An
CO-3	Illustrate Langevin's theory of Paramagnetism, Weiss Paramagnetism. To analyze the concept of Ferromagnetism and to summarize about domain theory of ferromagnetism and anti-magnetism	5	An,Ev
CO-4	Elaborate about the different types of electric polarizations and to classify and compare about the ionic, orientation and space charge polarization	1,8	An,Ap
CO-5	Classify and about types of bonds in crystals. To illustrate about Vanderwaal's and hydrogen bonding. Comparison of ionic and covalent solids.	1,4	Un,An

CO-6	Elaborate about cohesive energy of ionic solids and the application towards Sodium chloride crystal and the evaluation of Madelung Constant for sodium chloride can be done.	1,5	An,Ev
CO-7	Interpret the general properties of Super conductors. Elaborate the effect of magnetic field and Meissner effect, current of effect.	1,4	An
CO-8	Illustrate about entropy. To list out the application of superconductors	5,8	Re,An
CO-9	Describe about the nano particles and synthesis and its classification. Explain the techniques used in synthesis of nanomaterials and about chemical vapour deposition techniques.	1,3	Re,Ev
CO-10	Classify and compare the properties of nano materials. Applications of nano materials can also be explained.	1,3	Ev,Ap

#### Major Elective: a. Energy Physics

#### Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	Understand the importance of conventional and non-conventional energy resources.	1, 6	U
CO - 2	Understand the applications, merits, and demerits of conventional and non-conventional energy resources.	1	U, Ap
CO - 3	Understand the basic aspects of solar energy.	1, 6	U, C
CO - 4	Understand solar energy appliances with their merits and demerits.	1	U
CO - 5	Understand the basic aspects of the photovoltaic principle.	1, 6	U, Kc
CO - 6	Learn about photovoltaic appliances and how they work.	1	C, Ap
CO - 7	Understand the solar cell with its applications and its types.	1, 6	U, Kc
CO - 8	Understand the basic ideas of biomass energy and recognise their merits and demerits.	1, 6	U, An
CO - 9	Understand the methods and classifications of biomass energy.	1	U
CO - 10	Understand the basic principles of wind energy conversion.	1, 6	U
CO - 11	Understand the fundamental concepts of oceans and chemical energy resources, as well as their benefits and drawbacks.	1, 6	U, Ap

**Elective : b. MEDICAL PHYSICS**

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Define electromagnetic spectrum Sketch the X- ray tubedesign	1,2	Re, Ap
CO-2	Categorize half wave & full wave rectification	2	An
CO-3	Identify the sources of radio activity. Explain the units of radiation	1,3	Re, Un
CO-4	Measure the biological damage	4	Ev
CO-5	Discuss about CAT scanners, Identify transducers for biomedical applications	1	Ev, Un
CO-6	Estimate the computer analysis of ECG	5	Cr
CO-7	State radiography, Compare Ultrasound imaging & magnetic resonance imaging	1,3	Re,An
CO-8	Determine the uses of Gamma Camera	5	An
CO-9	Generalize the uses of lasers. Interpret the effect of laserradiation on tissues	5,8	Ap
CO-10	Justify laser as a beautician's tools	8	Ev

**Project**

**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Design, build and assess the working of scientific models individually as well as in groups	5, 6	Cr, Ev
CO-2	Plan research works related to crystal growth	5, 6	Cr
CO-3	Synthesize Nano materials and compile the characteristics	3, 5, 6	Cr
CO-4	Assess the output of electronic projects	2, 5, 6	Ev
CO-5	Interpret the physical phenomena in theoretical projects	5, 6	Ap
CO-6	Analyse the various properties of atmosphere using available software	5, 6	An
CO-7	Design solar appliances	5, 6, 7	Cr
CO-8	Calculate the thickness of different hairs using air wedge apparatus	1, 5, 6	An

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