

DEPARTMENT OF PHYSICS

PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE & POST GRADUATE PROGRAMME (2020 ONWARDS)

NAME OF THE PROGRAMME: B.SC PHYSICS – PROGRAMME OUTCOME	
PO1	Have an option for master education in Physics
PO2	A good option for to go with master degree in medical physics and specialized subject
PO3	A skill of good understanding of physics and also offer them opportunities to work as professional like lab assistant and to write varies government exams.
MSC PHYSICS	
PO1	Online tutor, Laboratory Technician, School Science Technician or Research Analyst, Observation Scientist, Assistant Scientist, Junior Research Fellow etc,
PO2	Can be able to further go and pursue a doctorate (PhD) in Physics.

NAME OF THE PROGRAMME: B.SC PHYSICS – COURSE OUTCOMES	
SEMESTER I	
MECHANICS	1. After studied unit-1, the student will be able to know fundamentals of vectors and able to formulate the expression for projectiles. 2. After studied unit-2, the student will be able to study the dynamics of rigid bodies in terms of moment inertia and also able to find the moment of inertia of different systems. 3. After studied unit-3, the student will be able to define work, energy and also able to understand the oblique impact between smooth spheres. 4. After studied unit-4, the student will be able to learn the elastic property of the solid materials and also derive the relation between elastic moduli. 5. After studied unit-5, the student will be able to explain the concept of gravitation and able to know the principles of rocket and satellite.
SEMESTER II	
HEAT AND	1. After studied unit-1, the student will be able to know

THERMODYNAMICS	fundamentals specific heat capacity and able to explain the kinetic theory of gases. 2. After studied unit-2, the student will be able to describe the conduction and radiation of heat and also able to study the Joule-Kelvin effect based on the low temperature phenomena and its applications. 3. After studied unit-3, the student will be able to cite the laws of thermodynamics and their applications. 4. After studied unit-4, the student will be able to explore the equations governing second law of thermodynamics and entropy. 5. After studied unit-5, the student will be able to explain Phase-space, micro and macrostates and able to distinguish MB, FD and BE statistics.
SEMESTER-III	
ELECTRICITY, MAGNETISM & ELECTROMAGNETISM	1. After studied unit-1, the student will be able to know fundamentals coulomb's law and Gauss's law and also able to derive the expression for electric potential, capacitance of a parallel plate capacitor. 2. After studied unit-2, the student will be able to derive the expression for temperature coefficient resistance of a coil using Carey Foster's Bridge and able to know how to calibrate the ammeter and voltmeter. Also students will be able to learn the thermo electricity concepts. 3. After studied unit-3, the student will be able to explain the concepts of self and mutual inductance using electromagnetic induction phenomenon. 4. After studied unit-4, the student will be able to distinguish the dia, para and ferro magnetic materials based on different theories. 5. After studied unit-5, the student will be able to formulate the expression for displacement current and Maxwell's equations.
BASIC ELECTRICAL TECHNOLOGY	1. After studied unit-1, the student will be able to know principle of Voltage, Current, Resistance, Ohm's law and Electrical safety. 2. After studied unit-2, the student will be able to distinguish between cells and batteries and able to explain the different types of batteries. After studied unit-3, the student will be able to understand the Wheastone's bridge, Thevenin and Norton's theorem and also able to describe the function of DC generator and motor. 3. After studied unit-4, the student will be able to know the fundamentals of alternating currents and voltages and able to differentiate the single phase and three phase connections. 4. After studied unit-5, the student will be able to acquire the principle and construction of transformers and its types and also able to demonstrate the function of AC generator.
ENVIRONMENTAL PHYSICS	1. After studied unit-1, the student will be able to basic concepts of atmosphere and also able to know how it can be measured and

	study the characteristics of cyclones. 2. After studied unit-2, the student will be able to explain the details of climate, greenhouse effect and global warming. 3. After studied unit-3, the student will be able to describe the different renewable energy sources and its applications. 4. After studied unit-4, the student will be able to know how to detect the nuclear radiation with different instruments. 5. After studied unit-5, the student will be able to know how to save ourselves from nuclear radiation hazards.
SEMESTER-IV	
WAVES AND OPTICS	1. After studied unit-1, the student will be able to formulate the equation for plane progressive wave and able to understand the concept of simple harmonic motion and other types of waves 2. After studied unit-2, the student will be able study the property of surface tension of a liquid and know how the surface tension varies with temperature and also able to explain the property of viscosity of a liquid. 3. After studied unit-3, the student will be able to describe the different optical of a lens system and able to design the eyepieces. Also able to know the phenomenon of interference and its applications. 4. After studied unit-4, the student will be able to distinguish between Fresnel class of diffraction and Fraunhofer class of diffraction. Also formulate the expression for resolving power of telescope, microscope, prism and grating. 5. After studied unit-5, the student will be able to explain the phenomenon of polarization and able to study the double refraction in uniaxial crystals. Also they can define optical activity, specific rotation and know the applications of polaroids.
PHYSICS WORKSHOP SKILLS	1. After studied unit-1, the student will be able to test the instruments with specific skills 2. After studied unit-2, the student will be able to express the functions and working of Linear power supply. 3. After studied unit-3, the student will be able to know the basics of analytical instruments and how to calibrate it. 4. After studied unit-4, the student will be able to explain mobile communication and radar communication system. 5. After studied unit-5, the student will be able to demonstrate the principle and working of various biomedical equipment.
EVERYDAY PHYSICS	1. After studied unit-1, the student will be able to know the fundamental quantities and units and able to some basic ideas of mechanics. 2. After studied unit-2, the student will be able to demonstrate the construction and working of pressure cooker, refrigerator, air conditioner devices. 3. After studied unit-3, the student will be fundamental principles

	applied in our day today life electrical appliances. - After studied unit-4, the student will be able to know the basic properties of laser and characteristics and able to design solid and gas lasers. - After studied unit-5, the student will be able to demonstrate the principle and working of biomedical equipment will be used in our daily life.
SEMESTER-V	
ATOMIC AND MOLECULAR PHYSICS	- After studied unit-1, the student will be able to know the properties of cathode rays and positive rays. Also will be able to study the determination of specific charge of an electron. - After studied unit-2, the student will be know the different atom models and can get an idea about coupling schemes. - After studied unit-3, the student will be able to study the Zeeman effect, Paschen Back effect and Stark effect. - After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation. - After studied unit-5, the student will be able to study the rotational and vibrational
RELATIVITY AND QUANTUM MECHANICS	- After studied unit-1, the student will be able to know the frames of reference and able to formulate the Galilean Transformation equations and Lorentz Transformation equations. - After studied unit-2, the student will be understand the matter waves and can derive an equation for de Broglie wavelength. Also able to distinguish between phase velocity and group velocity and demonstrate Davison & Germer experiment. - After studied unit-3, the student will be able to state the Heisenberg's Uncertainty Principle and able to derive the time dependent and time independent Schrödinger's equations. - After studied unit-4, the student will be able to know the basic idea of photoelectric effect and can able to derive the equation for Einstein's photoelectric equation. - After studied unit-5, the student will be able to learn postulates of quantum mechanics, operators and also able to acquire knowledge on Dirac's bra and ket notations
BASIC AND APPLIED ELECTRONICS	- After studied unit-1, the student will be able to classification of solids on the basis of band theory and know the construction, working and applications of semiconducting diodes and transistors. - After studied unit-2, the student will be able to design the RC-coupled amplifier and to study its frequency response curve. Also students will be able to classify the power amplifiers, to learn the h-parameters and to able to design oscillator circuits. - After studied unit-3, the student will be able to understand the multivibrators using transistors and can able to study the different

	wave shaping circuits. - After studied unit-4, the student will be able to know the basic idea of integrating circuits and able to fabricate diode, transistors, resistor and capacitors. Also students will be study the structure of operational amplifier and its parameters. - After studied unit-5, the student will be able to analyze the different applications of op-amp circuits like adder, subtractoretc.and also able to demonstrate 555 Timer and its applications.
CELL PHONE TECHNOLOGY	- After studied unit-1, the student will be able understand the cellular communication system. - After studied unit-2, the student will be able to study the smart phones and various mobile standards like 1G,2G, etc. - After studied unit-3, the student will be able to learn chip level information and soldering and desoldering the various components. After studied unit-3, the student will be able to understand the network problems and SIM card problems and to learn the trouble shooting process. - After studied unit-5, the student will be able to know how to use the ultrasonic cleaner, mobile virus and other service tools
SEMESTER-VI	
NUCLEAR AND PARTICLE PHYSICS	- After studying Unit 1, the student will have a clear idea about the fundamentals of nucleus and its structure. - After studying Unit 2, the student would have understood the concept of radioactivity. - After studying Unit 3, the student will be having a clear understanding of the design and working of particle accelerators and detectors. - After studying Unit 4, the student will be having a thorough understanding about the nuclear reactions and nuclear reactors. - After studying Unit 5, the student would have gained adequate knowledge about the elementary particles like pions, muons, hyperons etc.
SOLID STATE PHYSICS	- After studied unit-1, the student will be able to Distinguish between crystalline and amorphous solids, Classify the crystal systems and able to understand the crystal structure - After studied unit-2, the student will be able to Relate the X-ray diffraction with crystal structure and explain the various differences in properties of solids due to crystal imperfections - After studied unit-3, the student will be able to understand the different types of bonding in crystals, apply this to understand the optical , specific heat capacity of solids - After studied unit-4, the student will be able to again the knowledge of magnetism in materials and able to distinguish different magnetic materials. Also able to understand the phenomena of superconductivity and their applications

	5. After studied unit-5, the student will be able to explain the electric polarization in dielectric materials and also gain the knowledge in dielectric breakdown mechanisms in a dielectric material.
WEATHER FORECASTING	1. After studied unit-1, the student will be able to study the atmosphere and its physical structure and also to know the variation of pressure and temperature with height. 2. After studied unit-2, the student will be able to describe the measurement of wind speed, direction humidity, rainfall and can state the radiation laws. 3. After studied unit-3, the student will be able to explain the global wind systems and able to know thunderstorms and cyclones. 4. After studied unit-4, the student will be able to conceptualize the classification of climate, ozone depletion, acid rain and environmental hazards due to climate change. 5. After studied unit-5, the student will be able to understand the analysis and historical Background of weather forecasting and know the predictability, probability of forecasts.
DIGITAL ELECTRONICS	1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various Binary codes and to design basic logic gates. 2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates. 3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits. 4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters. 5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.
FUNDAMENTALS OF MICROPROCESSOR- 8085	1. After studied unit-1, the student will be able to know the evolution of microprocessor, pin and architecture of 8085 microprocessor in detail. After studied unit-2, the student will be able to describe different types of instructions like data transfer, arithmetic, logical and branching instructions with examples and it will be used for writing the assembly language programs. 2. After studied unit-3, the student will be able to write assembly language programs for simple arithmetic operations and hence they can apply it for interfacing applications. 3. After studied unit-4, the student will be able to learn the memory interface and peripheral interface devices. 4. After studied unit-5, the student will be able to know how to

	interface the peripheral device with microprocessor 8085 and they are able to write the programs for LED and Temperature control interface system.
NANOPHYSICS	1. After studied unit-1, the student will be able to know the origin and emergence of nanotechnology and also able to define different nanostructures. 2. After studied unit-2, the student will be able to describe carbon nanostructures and its fabrication. Also they can know the electrical, vibrational and mechanical properties of carbon nanostructure and its applications. 3. After studied unit-3, the student will be able to know how to fabricate the Nanomaterials by different methods. 4. After studied unit-4, the student will be able to learn the characterization techniques like XRD, UV-Vis, FTIR, EDAX, SEM, TEM etc for the synthesized nanostructures. 5. After studied unit-5, the student will be able to know the applications of nanotechnology in different field.
DIGITAL ELECTRONICS	1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various binary codes and to design basic logic gates. 2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates. 3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits. 4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters. 5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.
MATERIALS SCIENCE	1. After studied unit-1, the student will be able to know the origin engineering materials and its classification. Also students will be able to learn the bonding character and its Properties 2. After studied unit-2, the student will be able to describe mechanical properties like elastic behavior and thermal properties like heat capacity, thermal conductivity etc. 3. After studied unit-3, the student will be able to know the basics of polymers, ceramics and nanomaterial. 4. After studied unit-4, the student will be able to explain definition and types of smart materials. 5. After studied unit-5, the student will be able to conceptualize the energy storage materials.
MEDICAL PHYSICS	1. After studying Unit 1, the student will have a clear idea about the

	fundamentals of the production and characteristics of X-rays. 2. After studying Unit 2, the student would have understood the concept of radiation units and radiation detectors. 3. After studying Unit 3, the student will have a clear understanding of the design and working of Medical imaging techniques and computer tomography scanner. 4. After studying Unit 4, the student will be having a thorough understanding about the diagnostic nuclear medicine and some medical instrumentation. 5. After studying Unit 5, the student would have gained adequate knowledge about the protective measures to be undertaken in radiation therapy.
DIGITAL ELECTRONICS	1. After studied unit-1, the student will be able to gain knowledge between different types of number systems, and their conversions. Also able to study the various binary codes and to design basic logic gates. 2. After studied unit-2, the student will be able to describe laws of Boolean Algebra, De Morgan's theorems. Also able to demonstrate K-Map and simplification of logic expressions and to design universal gates using NAND and NOR gates. 3. After studied unit-3, the student will be able to explain the Multiplexer, Demultiplexer and Decoder. Students can know the functions of various Flip-Flop circuits. 4. After studied unit-4, the student will be able to conceptualize the classification of registers and counters. 5. 5. After studied unit-5, the student will be able to know how to convert digital to analog and analog to digital using different methods.
RADIATION SAFETY	1. After studied unit-1, the student will be able to study the basics of atomic structure and nuclear composition. 2. After studied unit-2, the student will be able to describe properties of alpha, beta and gamma rays and also to study the interaction of charged particles. 3. After studied unit-3, the student will be able to explain radiation quantities and units and also able to know the principle and working of radiation detectors. 4. After studied unit-4, the student will be able to conceptualize the radiation safety management. 5. After studied unit-5, the student will be able to know the application of nuclear techniques in medicinal science.
ASTROPHYSICS	1. After studied unit-1, the student will be able to study the different types of optical instruments like telescopes and spectrographs will be used for observing/recording the space objects. 2. After studied unit-2, the student will be able to describe big bang theory, different types of galaxies, milky way and astronomical unit.

	3. After studied unit-3, the student will be able to explain about stars, constellations, asteroids, meteorites and comets. 4. After studied unit-4, the student will be able to know the details of solar system and able to know the formation eclipse due to sun, moon and earth. 5. After studied unit-5, the student will be able to understanding the different space programmers/missions carried out by our Indian Space Research Organization (ISRO) and also to study the lunar and solar calendars.
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NAME OF THE PROGRAMME: MSc PHYSICS - COURSE OUTCOMES	
SEMESTER –I	
MATHEMATICAL PHYSICS-I	1. After studied unit-1, the student will be able to explain linear vector spaces and matrices and can solve the problems. 2. After studied unit-2, the student will be able to describe tensors in detail. 3. After studied unit-3, the student will be able to solve the differential equations. 4. After studied unit-4, the student will be able to formulate the differential equations for special functions. 5. After studied unit-5, the student will be able to understand Dirac-Delta function, Introduction on Green functions and Green's function for one dimensional and three dimensional cases.
CLASSICAL AND STATISTICAL MECHANICS	1. After studying unit-1, the student will have depth knowledge about Lagrangian and solve problems in mechanical systems using Lagrangian formulation. Understand conservation theorems and its relevance in classical formulation. Learn Hamiltonian formulations and solve problems using Hamiltonian formulation. 2. After studying unit-2, the student will be able to 3. Apply Hamilton's characteristic function to solve problems , 4. Understand Action Angle variables and solve one degree of freedom and Kepler's problem Acquire knowledge about oscillatory motion and stability of oscillatory motion 5. After studying unit-3, the student will have knowledge about fundamentals of rigid body motion. Explain Moment of inertia tensor. Derive and solve Euler's angles Euler's equations of motion. 9 Able to solve problems on force free motion of a rigid body and symmetrical top. 6. After studying unit-4, the student will be able to 7. Explain different statistical ensembles, their distribution functions, ranges of applicability and the corresponding

	thermodynamic potentials. Calculate basic thermo dynamical quantities in classical and quantum statistical models. Understand and solve problems on partition and translational partition function. - After studying unit-5, the student will be able to - Apply quantum distribution laws and solve Bose-Einstein condensation of gases and Photon gas. Signify the results of Planck's law of radiation and its limitation. Explain Thermionic emission and Pauli's theory of Para magnetism.
QUANTUM MECHANICS-I	- The interpretation of wave function of quantum particle and quantum theory formulation is introduced through Schrodinger equation, student gets exposed to the behaviour of quantum particle encountering a i) barrier, ii) potential well. - Understand the general formulation of quantum mechanics which deal with the abstract object such as kets, bras, and operators. - Acquire knowledge about unitary transformation and able to analyse Schrodinger and Heisenberg interaction pictures. - Gain the knowledge of solving non-relativistic hydrogen atom, expectation value and density matrix. - Gain the knowledge about spin, angular momentum states, addition rules and identical particles.
ELECTRONIC DEVICES AND APPLICATIONS	- After studying unit-I, the students will be able to: understand the characteristics and significance of logic families Identify different types of logic families describe fundamental and applied aspects of optoelectronic device. physics and its applications to the design and operation of laser diodes, light-emitting diodes, and photo detectors - After studying unit-II, the students will be able to: understand the significance of Op-amps and their importance understand various linear/non-linear applications to solve simultaneous equations and second order differential equations - After studying unit-III, the students will be able to: understand about the 555 timer and applications explain the working of multivibrators using IC 555 Illustrate the function of application of PLL and its applications - After studying unit-IV, the students will be able to: Know the principle and working of transducers Explain different types of transducers - After studying unit-V, the students will be able to: Compare different modulation schemes with their advantages, disadvantages and applications. Use modulation and demodulation techniques in analog and digital communications able to understand the concept of

	MODEM and MODEM interfacing.
FIBRE OPTIC COMMUNICATION	1. After studied unit-1, the student will be able to explain basics and electromagnetic wave and can derive the Maxwell's equations. 2. After studied unit-2, the student will be able to describe waveguides and sources 3. After studied unit-3, the student will be able to demonstrate the different characteristic of optical fibers 4. After studied unit-4, the student will be able to design the fabrication and connection of optical fibers. 5. After studied unit-5, the student will be able to understand nonlinear effects in fibers and solitons and applications.
ELECTRONIC COMMUNICATION SYSTEMS	1. After studied unit-1, the student will be able to know the principle of antenna and its types. 2. After studied unit-2, the student will be able to explain error detection, parity check etc. 3. After studied unit-3, the student will be able to understanding the satellite the principle of GEO, MEO and LEO. 4. After studied unit-4, the student will be able to learn the cellular networks like TDMA. 5. After studied unit-5, the student will be able to know the wireless LAN applications and its types.
ENERGY PHYSICS	1. After studied unit-1, the student will be able to explain thermal conversion 2. After studied unit-2, the student will be able to describe performance of flat-plate collectors 3. After studied unit-3, the student will be able to design the thermal energy storage devices 4. After studied unit-4, the student will be able to understand the principles of photovoltaic conversion 5. After studied unit-5, the student will be able to know other forms of renewable energy sources.
COMMUNICATION PHYSICS	1. After studied unit-1, the student will be able to understand the different types of modulation will be used in radio transmission and reception. 2. After studied unit-2, the student will be able to know the basics of fiber optics and its types 3. After studied unit-3, the student will be able to learn the principle of radar communication 4. After studied unit-4, the student will be able to describe the satellites and its importance, 5. After studied unit-5, the student will be able to demonstrate the different types of mobile phones and updating the knowledge about Wi-Fi and fourth generation of communication system.

SEMESTER II	
MATHEMATICAL PHYSICS-II	1. After studied unit-1, the student will be able to learn analytic functions, derive an equation for Cauchy-Riemann Differential equations in different forms about Taylor, Laurent's series and Cauchy Residue theorem 2. After studied unit-2, the student will be able to obtain the solution for Laplace's Equations in Cartesian coordinates and also for two and three dimensional heat flow 3. After studied unit-3, the student will be able to study the Fourier and Laplace's Integral Transforms in detail 4. After studied unit-4, the student will be able to describe group theory and construct the character table for different point groups 5. After studied unit-5, the student will be able to acquire theory of probability and different theoretical distributions.
ELECTRO MAGNETIC THEORY	1. After studying Unit-1, the students will be able to have a depth knowledge of electrostatics and clearly understand dielectric polarization. 2. After studying Unit-2, the students will be able to know the fundamental laws to find the magnetic field of a source. have depth knowledge of magnetic potential. apply the magnetic scalar and vector potentials to find the magnetic field due to localized source. 3. After studying Unit-3, the students will be able to use Maxwell's equations for a system of charge and electromagnetic field. Obtain homogeneous equations for a charged system. Students will be able to understand clearly Gauge transformation and gauge invariance. 4. After studying Unit-4, the students will be able to Understand about the oscillating dipole. Know how the power radiated from a linear antenna. Understand clearly antenna arrays. 5. After studying Unit-5, the students will be able to Know the propagation of electromagnetic waves in free space, dielectric medium and Conducting medium. Have depth knowledge of kinematic and dynamic properties of electromagnetic waves. Understand the wave propagation principle in the case of wave guide.
QUANTUM MECHANICS-II	1. Understand the concept of perturbation theory to solve problems in quantum mechanics. 2. Acquire the knowledge of variation methods and able to solve harmonic perturbation step by step using mathematical methods. 3. Formulates ideas on born approximation transformation and concepts of scattering theory. 4. Understand the Dirac matrices and gained knowledge about

	spin and magnetic movement of electron. 5. Able to understand the creation and annihilation operator and gain the knowledge about anti particle.
NANOSCIENCE	1. After studied unit-1, the student will be able to understand the nanoscale and nanomaterial. 2. After studied unit-2, the student will be able to learn how to synthesis the nanostructured materials 3. After studied unit-3, the student will be able to distinguish between nanoparticles and quantum dots 4. After studied unit-4, the student will be able to describe the different tools will be used for characterization of the nanomaterial. 5. 5. After studied unit-5, the student will be able explain the different applications of nanotechnology
ELECTRONICS INSTRUMENTATION	1. After studied unit-1, the student will be able to know the principle, working and types of transducers. 2. After studied unit-2, the student will be able to demonstrate the principle, function of different digital instruments like digital multimeter. 3. After studied unit-3, the student will be able to explain the working and applications of Photoelectron Spectroscopy (XPS) , Auger Electron Spectroscopy, Atomic Absorption Spectroscopy. 4. After studied unit-4, the student will be able to describe the operation of ECG, EEG and EMG biomedical instrumentations. 5. After studied unit-5, the student will be able to know the classification of printers, function of hard disk, CD and DVD.
NON-LINEAR OPTICS	1. After studied unit-1, the student will be able to understand the laser and its types 2. After studied unit-2, the student will be able to know the fundamentals of non-linear optics. 3. After studied unit-3, the student will be able to study the multiphonon process in nonlinear optics. 4. After studied unit-4, the student will be able to learn the basic requirements for nonlinear optical materials like borates, organics etc. 5. . After studied unit-5, the student will be able explain the principle, construction and working of fiber modes.
SPECTROSCOPY AND LASERS	1. After studied unit-1, the student will be able to learn more about microwave spectroscopy and its applications. 2. After studied unit-2, the student will be able to know the fundamentals of vibrational spectroscopy and can assign normal modes of vibrations for different type of molecules. 3. After studied unit-3, the student will be able to distinguish

	the classical and quantum theory of Raman spectroscopy and it will be applied for structural confirmation of a molecule. - After studied unit-4, the student will be able to derive the expression for Einstein Coefficients for Stimulated emission of Radiation and learn about three level and four level systems. - After studied unit-5, the student will be able describe the different types of Laser and know the condition for population inversion and can study the Laser applications.
PHYSICS FOR COMPETITIVE EXAMS	- After studied unit-1, the student will be able to understand the concept of mechanics and to study the different properties of matter - After studied unit-2, the student will be able to learn about First and second law of thermodynamics and also provided basics of entropy - After studied unit-3, the student will be able to study the magnetism and magnetic materials - After studied unit-4, the student will be able to explain the phenomenon of interference, diffraction and polarization and also to describe the fundamentals of laser - After studied unit-5, the student will be able to demonstrate the atomic structure using Bohr's theory and also derive Einstein's Mass-Energy relation. Also they acquired knowledge on fundamentals of semiconductors.
ANALOG AND DIGITAL ELECTRONICS	- After studied unit-1, the student will be able to understand basics of semiconductors and able to distinguish between N-Type and P-Type semiconductors. - After studied unit-2, the student will be able to design rectifier circuits using diodes and amplifier circuits using transistors. - After studied unit-3, the student will be able to perform the various mathematical operations using OP-AMP. - After studied unit-4, the student will be able to understand the different number systems and to know how to convert one number to another number system. - After studied unit-5, the student will be able to demonstrate the basic logic gates AND, OR and NOT gates using diodes and transistor and also explain the Universal logic gates using NAND and NOR gates.
RESEARCH METHODOLOGY	- After studied unit-1, the student will be able to know the basics of research theories, approaches and design. - After studied unit-2, the student will be able to demonstrate

	what do you mean by review of literature and know how to proceed the research work based on review of literature. 3. After studied unit-3, the student will be able to explain the importance of internet in the field of research. 4. After studied unit-4, the student will be able to how to write a thesis or a research paper. Also students will be able to learn how to present a research article in a seminar/conference or how to publish the article in e-journals. 5. After studied unit-5, the student will be able to formulate the Euler's method, Range Kutta method, Trapezoidal rule and Simpson's 1/3rd rule of numerical methods.
MATERIAL SCIENCE	1. After studied unit-1, the student will be able to know the concepts of phase diagrams and phase transformations. 2. After studied unit-2, the student will be able to explain the property of ceramic materials and also able to learn polymerization mechanism. 3. After studied unit-3, the student will be able to explain the chemical structure and property of biomaterials. 4. After studied unit-4, the student will be able to understand the properties NLO materials and its harmonic generation. 5. After studied unit-5, the student will be able to design the energy conversion and storage materials.
NUMERICAL METHODS & C PROGRAMMING	1. After studied unit-1, the student will be able to get the solutions using different numerical methods. 2. After studied unit-2, the student will be able to explain the fundamentals of research and know how to write a thesis or paper. 3. After studied unit-3, the student will be able to understand the basic structure of C programming. 4. After studied unit-4, the student will be able to learn the one, two and multidimensional arrays and also know the reading and writing strings. 5. After studied unit-5, the student will be able to write different programs after learning the structure of C programming.
SEMESTER III	
CONDENSED MATTER PHYSICS	1. After studied unit-1, the student will be able to know the types of lattices and crystal structures. 2. After studied unit-2, the student will be able to explain lattice dynamics like Einstein's model and Debye's model of specific heat. 3. After studied unit-3, the student will be able to study Band theory of metals and semiconductors and also able to explain Kronig-Penny model. 4. After studied unit-4, the student will be able to understand

	the quantum theory of paramagnetism and ferromagnetism. 5. After studied unit-5, the student will be able to basics of superconductors and its applications. Also able to differentiate Type I and Type II superconductors.
NUCLEAR PHYSICS	1. After studied unit-1, the student will be able to understand the concept of nuclear energy levels, nuclear angular momentum, parity and isospin. Also able to explain nature and properties of nuclear forces. 2. After studied unit-2, the student will be able to describe Gamow's theory, Fermi's theory of beta decay and kinematics of gamma decay. Also able to derive the Breit Wigner single level formula. 3. After studied unit-3, the student will be able to differentiate different nuclear models. 4. After studied unit-4, the student will be able to know the principle and working of G.M. counter, scintillation detectors and particle accelerators. 5. After studied unit-5, the student will be able to obtain Gell-mann--Nishijima formula and Gell – Mann Okubo mass formula. Also able to explain the classification of elementary particles.
MICROPROCESSORS & MICROCONTROLLERS	1. After studied unit-1, the student will be able to know various interrupts, timing diagram for memory read/write cycle and able to write assembly language programs. 2. After studied unit-2, the student will be able to describe the different interfacing devices and can demonstrate the interfacing of DAC/ADC and stepper motor with 8085. 3. After studied unit-3, the student will be able to understand the hardware of 8051, memories, Counter and Timer. 4. After studied unit-4, the student will be able to explain the interrupts, addressing modes and arithmetic operations. 5. After studied unit-5, the student will be able to describe PUSH-POP, jump and call instructions and able to know how to interface the peripheral devices with 8051.
PHYSICS OF MATERIALS	1. After studied unit-1, the student will be able to learn the basics of crystal structure and various types of bond exists in the crystals 2. After studied unit-2, the student will be able to know the statement of Bragg's law and to study the Diffraction of X-ray by different methods 3. After studied unit-3, the student will be able to understand the classical and quantum theory of free electrons in metals 4. After studied unit-4, the student will be able to distinguish between intrinsic and extrinsic semiconductor and can determine the Hall coefficient of a material 5. After studied unit-5, the student will be able to describe

	the properties of superconductors and hence the students can distinguish Type I and Type II superconductors
GEOPHYSICS	1. After studied unit-1, the student will be able to explain about solar system and atmosphere, ionosphere etc. 2. After studied unit-2, the student will be able to demonstrate geo referencing using GIS software and to test the contamination of ground water using geochemical method. 3. After studied unit-3, the student will be able to describe about earthquakes and natural disaster Tsunami and its impacts 4. After studied unit-4, the student will be able to learn about the earth in the presence of magnetic field and gravity 5. After studied unit-5, the student will be able to know the radioactivity of the earth, can calculate the radioactive dating of rocks and minerals and thermal properties of the earth.
SEMESTER IV	
SPECTROSCOPY	1. After studied unit-1, the student will be able to study the rotational spectra of diatomic and polyatomic molecules using rotational/ microwave spectroscopy. 2. After studied unit-2, the student will be able to distinguish between the rigid rotator and non-rigid rotator and students can calculate normal modes of vibrations for H₂O and N₂O molecules. 3. After studied unit-3, the student will be able to derive the expression for classical and quantum theory of Raman effect and also to study the molecular structure of water and CO₂ molecules. 4. After studied unit-4, the student will be able to understand the qualitative idea of UV spectroscopy and also to learn the electronic spectra of poly atomic molecules. 5. After studied unit-5, the student will be able to know qualitatively the principle, theory, instrumentation and applications of NMR, ESR, AAS and Mössbauer spectroscopy
CRYSTAL GROWTH AND THIN FILMS	1. After studied unit-1, the student will be able to learn the different theories of crystal growth and able to formulate Gibbs - Thomson equation. 2. After studied unit-2, the student will be able to demonstrate the Bridgman technique, Czochralski method, Skull Melting process etc. of crystal growth. 3. After studied unit-3, the student will be able to understand the symmetry operations, elements, point groups, space groups and defects in crystals. 4. After studied unit-4, the student will be able to explain the basics of thin film deposition techniques like, spin coating, chemical bath deposition, spray pyrolysis etc.

	After studied unit-5, the student will be able to know the principle, working and applications of different characterization techniques.
MEDICAL PHYSICS	- After studied unit-1, the student will be able to study the different sources of nonionizing radiations. - After studied unit-2, the student will be able to know the various types of optical radiations like UV,IR etc. - After studied unit-3, the student will be able to explain the laser and fiber optic instruments for mediphotonics. - After studied unit-4, the student will be able to learn the properties and propagation of ultrasonic waves and also able to know the ultrasonic dosimetry. - After studied unit-5, the student will be able to understand the applications of radio frequency and microwaves.
MATLAB AND PYTHON PROGRAMMING	- After studied unit-1, the student will be able to understand the basics of MATLAB - After studied unit-2, the student will be able to develop skills for writing a program using MATLAB - After studied unit-3, the student will be able to learn the fundamentals of Python programming - After studied unit-4, the student will be able to know the concepts of OOPs in Python - After studied unit-5, the student will be able to learn how to develop graphical user interfaces by writing some Python GUI examples using Tkinter package.
ASTRO PHYSICS	- After studied unit-1, the student will be able to know the principle and working of astronomical instruments. - After studied unit-2, the student will be able to explain big bang theory and galaxies - After studied unit-3, the student will be able to demonstrate variety of stars. - After studied unit-4, the student will be able to describe the complete details of solar system including comets. - After studied unit-5, the student will be able to the units to be used for the measurements celestial distance and coordinates
	- After studied unit-1, the student will be able to study the atmosphere and its physical structure and also to know the variation of pressure and temperature with height - After studied unit-2, the student will be able to describe the measurement of wind speed, direction humidity, rainfall and can state the radiation laws - After studied unit-3, the student will be able to explain the global wind systems and able to know thunderstorms and cyclones - After studied unit-4, the student will be able to conceptualize

WEATHER FORECASTING	the classification of climate, ozone depletion, acid rain and environmental hazards due to climate change 5. After studied unit-5, the student will be able to understand the analysis and historical background of weather forecasting and know the predictability, probability of forecasts
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