DEPARTMENT OF PHYSICS, GOVERNMENT COLLEGE GURUR, BALOD, C.G.

Name of Faculty – Mr. Lekhram Hirwani Designation – Assistant Professor	Yearly Teaching Plan 2022 - 23	Class - B.Sc. 03rd Year Subject – Physics Subject Code - 006326

Name of Program, Class and Paper	Syllabus (Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics)	Required Duration
B.Sc. (Maths) 03rd Year Paper – I	**UNIT-I** Reference systems, inertial frames, Galilean invariance and conservation laws, propogation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of ralativity, Lorentz tranformations, length contraction,time dilation, velocity additon theorem, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass, Compton effect. **UNIT-II** Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect. Wave-particle duality and uncertainty principle : de Broglie's hypothesis for matter waves : the concept of wave and group velocities, evidence for diffraction & interference of particles, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a box, wave packets. Consequence of the uncertainty relation : gamma ray microscope, diffraction at a slit. **UNIT-III** Quantum Mechanics : Schrodinger's equation. Postulatory basis of quantum mechanics, operators, expectation values, transition probabilities, applications to particle in a oneand three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier. Hydrogen atom : natural occurrence of n, l and m quatum numbers, the related physical quantities. **UNIT-IV** Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s,p, d and f states, selection rules. Discrete set of elctronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotatinal and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy. **UNIT-V** Interaction of charged particles and neutrons with mater, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions. Structure of nuclei, basic properties (r 1 ,μ Q and binding energy), deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces, Beta decay, range of alpha particle Geiger-Nuttal law. Gamow's explanation of beta decay, alpha decay and continuous and discrete spectra. Nuclear reactions, channels, compound nucleus, direct reaction (concepts). Shell model & liquid drop model, fission and fusion (concepts), energy production in stars by p-p and carbon cycles (concepts) .	12 Hours (40 Min. x 18 Periods) Per Unit = 90 Periods (From August 22 to February 23)

Name of Program, Class and Paper	Syllabus (Solid State Physics, Solid State Devices and Electronics)	Required Duration
B.Sc. (Maths) 03rd Year Paper - II	**UNIT-I** Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law. Bonding in solids, classification. Cohesive energy of solid. Madelung constant, evaluation of Parameters. Specific heat of solids, classical theory (Dulong-Petit's law). Einstein and Debye theories. Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone. **UNIT-II** Free electron model of a metal, Solution of one dimensional Schrodiner equation in a constant potential. Density of states. Fermi Energy, Energy bands in a solid (KronigPenny model without mathematical details). Metals, Insulator and Semiconductors. Hall effect. Dia, Para and Ferromagnetism. Langevin's theory of dia and para-magnetism. CurieWeiss's Law. Qualitative description of Ferromagnetism (Magnetic domains), B-H. curve and Hysteresis loss. **UNIT-III** Intrinsic semiconductors, carrier concentration in thermal equilibrium, Fermi level, Impurity semiconductor, doner and acceptor levels, Diode equation, Junctions, Junction breakdown, Depletion width and junction capacitance, abrupt junction, Tunnel diode, Zener diode. Light emmitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET. **UNIT-IV** Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, T and N filters, Zener diode, regulated power supply. Applications of transistors. Bipolar Transistor as amplifier. Single stage and CE small signal amplifiers, Emitter followers, Transistoras power amplifier, Transistor as oscillator, Wein-Bridge Oscillator and Hartley oscillator. **UNIT-V** Introduction to computer organisation, time sharing and multi programming systems, window based word processing packages, MS Word. Introduction to C programming and application to simple problems of arranging numbers in ascending / descending orders : sorting a given data in an array, solution of simultaneous equation.	**12 Hours (40 Min. x 18 Periods) Per Unit** **= 90 Periods (From August 22 to February 23)**
	Total Duration : 120 Hours	**180 Periods**

Faculty

HOD

IQAC Coordinator
Co-ordinator
IQAC
Government College Gurur
Dist. Balod (C.G.)

Principal
Government College Gurur
Dist. Balod (C.G.)

Monthly Teaching Plan 2022 – 2

Program Name – B.Sc. (Maths) **Class – 03rd Year** **Paper – 01st (Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics)**
Paper – 02nd (Solid State Physics, Solid State Devices and Electronics)

S N	Month	Curriculum Plan	No. of Periods	Teaching Method	Activity Plan	Exam or Test
01	August 2022	**PAPER – I, UNIT-I** Reference systems, Inertial frames, Galilean invariance and conservation laws, propogation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of ralativity, Lorentz tranformations, length contraction,time dilation, velocity additon theorem, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass, Compton effect. **PAPER – I, UNIT-II** Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect. Wave-particle duality and uncertainty principle : de Broglie's hypothesis for matter waves : the concept of wave and group velocities, evidence for diffraction & interference of particles, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a box, wave packets. Consequence of the uncertainty relation: gamma ray microscope, diffraction at a slit.	18 18	Chock & Talk PPT Doubt Class Revision Class Extra Class	Poster Making Student Seminar	Unit Test
02	September 2022	**PAPER – II, UNIT-I** Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law. Bonding in solids, classification. Cohesive energy of solid. Madelung constant, evaluation of Parameters. Specific heat of solids, classical theory (Dulong-Petit's law). Einstein and Debye theories. Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone. **PAPER – II, UNIT-III** Intrinsic semiconductors, carrier concentration in thermal equilibrium, Fermi level, Impurity semiconductor, doner and acceptor levels, Diode equation, junctions, junction breakdown, Depletion width and junction capacitance, abrupt junction, Tunnel diode, Zener diode. Light emmitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET.	18 18	Chock & Talk PPT Chart Demonstration Doubt Class Revision Class Extra Class	Poster Making Student Seminar Group Discussion	Unit Test

03	October 2022	**PAPER – I, UNIT-III** Quantum Mechanics: Schrodinger's equation. Postulatory basis of quantum mechanics, operators, expectation values, transition probabilities, applications to particle in a oneand three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier. Hydrogen atom: natural occurrence of n, l and m quatum numbers, the related physical quantities.	**18**	Chock & Talk PPT Doubt Class Revision Class	Poster Making Student Seminar Quiz Competition	Unit Test
04	November 2022	**PAPER – II, UNIT – IV** Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and π section filters, Zener diode, regulated power supply using zener diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark Hausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.	**18**	Chock & Talk PPT Chart Doubt Class Revision Class Extra Class	Poster Making Student Seminar Quiz Competition	Unit Test & Sessional Exam - I
05	December 2022	**PAPER – I, UNIT-IV** Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s,p, d and f states, selection rules. Discrete set of elctronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotatinal and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy. **PAPER – II, UNIT –V** Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.	**18** **18**	Chock & Talk PPT Chart Demonstration Doubt Class Revision Class Extra Class	Poster Making Student Seminar Group Discussion	Unit Test & Sessional Exam - II
06	January 2023	**PAPER – I, UNIT – V** Structure of nuclei:- Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (6) Magnetic Moment (μ), (7) Stability and (8) Binding Energy, Nuclear Models:- Liquid Drop Model, Mass formula, Shell Model, Types of Nuclear reactions, laws of conservation, Q-value of reactions, Interaction of Energetic particles with matter, Ionization chamber, GM Counter, Cloud Chambers, Fundamental Interactions, Classification of Elementary Particles, Particles and Antiparticles, Baryons, Hyperons, Leptons, and Mesons, Elementary Particle Quantum Numbers: Baryon	**18**	Chock & Talk PPT Chart Doubt Class Revision Class	Poster Making Student Seminar	Pre Final Exam

		Number, Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin. Introductory idea of discovery of Higg's Boson.				
07	February 2022	**PAPER – II, UNIT – II** Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential, Density of states, Fermi Energy, Energy bands in a solid (Kronig-Penny model without mathematical details), Difference between Metals, Insulator and Semiconductors, Hall effect, Dia, Para and Ferromagnetism, Langevin's theory of dia and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.	**18**	Chock & Talk PPT Doubt Class Revision Class	Poster Making Student Seminar	-
	07 Months	**Two Papers , Unit – 10**	**180 Periods**			**07 Internal Exams**

Faculty

HOD

IQAC Coordinator
Co-ordinator
IQAC
Government College Gurur
Dist. Balod (C.G.)

Principal
Government College Gurur
Dist. Balod (C.G.)