Government College, Nagda, Distt. – Ujjain (M. P.)
B.Sc. 3rd year 2nd paper planner

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Teacher's Name - Dr. K.C. Mishra **Subject- Physics**
Class- B.Sc. 3rd year **Paper- Paper2**
Session- 2023-24

week	TIME	UNIT(no.)	Unit name	(SYLLABUS & TOPICS)
1		1	Crystal Structures	Premier Indian Institutes and their contribution: Bhabha Atomic Research Centre, Mumbai, Advanced Materials and Processes Research Institute (AMPRI), Bhopal; Defense and Research Development Organization, New Delhi; Indian Institute of Science, Bangalore, Bose Institute, Kolkata, Raja Ramanna Centre for Advanced Technology, Indore
2		1	Crystal Structures	Classification of solids and space lattice: Crystalline and amorphous solids; Space lattice; Basis; Lattice translational vector; Unit cell; Primitive and non- primitive cells; Bravais lattice in two and three dimensions; Seven crystal systems; Fundamentals of elements of symmetry; Point groups and space groups; Lattice planes and miller indices;Coordination numbers and atomic packing fraction. Reciprocal lattice and its properties, Diffraction in crystal: Laue's and Bragg's equations; Determination of crystal structure by X-rays (Powder method).
3		2	Crystal Structures	Relation between interplanar spacing and lattice constants. Simple crystal structures: Simple cubic; Face centered cubic (NaCl); Body centered cubic (CsCl); Hexagonal closed packed; Diamond and Zinc sulfide structure;
4		2	Physical properties of matter	Specific heat: Specific heat of solid and its variation with temperature; Classical theory of Dulong and Petit; Einstein model

				assumptions and derivation for specific heat; Debye model assumptions and derivation for specific heat; Outcomes of different models. Lattice vibrations in crystal: Mono-atomic lattice vibration and dispersion relation; Brillouin Zones: Concept of phonons. 3. Motion of electrons in metals: Lorentz Drude theory, electrical resistivity and electrical conductivity; Ohm's Law (J=GE); Wiedemann Frenz law; Hall effect, Hall coefficients and experimental determination.
5		3	Solid state devices and applications	Energy bands and semiconductors: Formation of energy bands in solid; Semi-conductors: Intrinsic and extrinsic; Concept of Fermi energy and Fermi energy level; Mobility and drift velocity of charge carriers; Conductivity of semiconductors; Derivation for expression of concentration of electrons and holes in an intrinsic and extrinsic semiconductor, P-N Junction, depletion layer, expression for potential barrier; Current equation for P- N junction diode.
6		3	Solid state devices and applications	Construction, operation and characteristic curve of diodes: P- N Junction Diode in forward and reverse bias; Characteristics curve; Static and dynamic resistance; Avalanche and Zener Breakdown; Zener diode and its application as a voltage regulator, Photodiode, Light Emitting diode and Solar cell. Paper Rectification: Half wave, full wave and bridge rectifier. Electrical circuit and working; Determination of efficiency; Ripple factor and voltage regulation; Unregulated and regulated power supply.
7		4	.Transistor and amplifier	Transistors: Bipolar Junction Transistors (PNP and NPN): Biasing and operation; Operation of transistors in common base, common emitter and common collector modes and their characteristic curves; Relation between current gains (a, ß and y); Hybrid (h)- parameters of transistor, JFET and MOSFET and its characteristic curve. Transistor biasing: Biasing stabilization in

				transistor; Thermal runaway and stability factor; Method of transistor biasing (voltage dividing method). 3. Amplifiers: Amplifiers and their classification in brief; Single stage common emitter amplifier, RC coupled Amplifier; Q-point, load line and frequency response curve, Power amplifiers (only introduction).
8		4	Oscillators, Modulation and demodulation	Oscillators: Principle of feedback amplifiers; Positive and negative feedback amplifiers; Principle of an oscillator and Barkhausen criterion; Introduction to Phase shift and Wien bridge oscillator.
9		5	Oscillators, Modulation and demodulation	Modulation: Definition; Theoretical analysis of amplitude modulation; Modulation index; Sidebands and bandwidth; Power dissipation in modulated wave. PHYSIC X
10		5	Oscillators, Modulation and demodulation	Frequency modulation: Definition and mathematical analysis of frequency modulated wave; Modulation index, frequency spectrum and bandwidth. Phase modulation: Definition and theoretical analysis; Comparison among amplitude, frequency and phase modulation. Demodulation: Principle of detection of Amplitude Modulated wave; P-N diode as square law detector.