

GOVT COLLEGE ROPAR
PHYSICS DEPARTMENT
SESSION 2022-2023

Class: B Sc III (Sem V)

Subject: Condensed Matter Physics-I

Tentative lesson plan from August 2022 to November 2022

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Crystal Structure. Symmetry operations for a two dimensional crystal.
Week 2	Two dimensional Bravais lattices,
Week 3	Three dimensional Bravais lattices" Basic primitive cells
Week 4	Crystal planes and Miller indices.
Week 5	Diamond and NaCl structure.
Week 6	Packing fraction for Cubic and hexagonal closed packed structure.
Week 7	Crystal Diffraction: Bragg's Law,
Week 8	Experimental methods for crystal structure studies,
Week 9	laue equations, Reciprocal lattices of SC,
Week 10	Reciprocal lattices of BCC and FCC,
Week 11	Bragg's Law in reciprocal lattice.
Week 12	Brillouin zones and its derivation in two dimensions,
Week 13	Structure factor and atomic form factor

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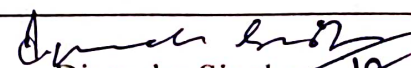
B Sc III (Sem V)


Subject: ELECTRONICS-I (ELECTRONICS AND SOLID STATE DEVICES)

Tentative lesson plan from August 2022 to November 2022

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Concept of current and voltage sources, p-n junction, Biasing of diode,
Week 2	V-A characteristics. Diode equation, Breakdown diodes: Zener breakdown and avalanche breakdown,
Week 3	Zener diode. Rectification: half wave, full wave rectifiers
Week 4	bridge rectifiers, Qualitative analysis of Filter circuits (RC LC and π filters
Week 5	Efficiency, Ripple factor, Voltage regulation.
Week 6	Voltage multiplier circuits. Junction transistor: structure and working
Week 7	relation between different currents in transistors,
Week 8	Sign conventions. Amplifying action, Different configurations of a transistor and their comparison,
Week 9	CB and CE characteristics. Structure, Characteristics, operation of FET,
Week 10	Characteristics, operation of JFET and MOSFET, Pinch off voltage,
Week 11	Enhancement and Depletion mode, Comparison of JFETs and MOSFETs,
Week 12	Difference in field effect transistor and junction type transistor.
Week 13	Photo-conductive devices: Photo-conductive cell, Photodiode, Solar cell, LED, LCD.


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PHYSICS DEPARTMENT
SESSION 2022-2023

B Sc III (Sem V)

Subject: : NUCLEAR AND RADIATION PHYSICS

Tentative lesson plan from August 2022 to November 2022

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Constituents of nucleus and their intrinsic properties, Qualitative facts about size, mass, density, energy, charge.
Week 2	Binding energy, angular momentum, magnetic moment and electric quadruple moments of the nucleus,
Week 3	Wave mechanical properties of nucleus, average binding energy and its variation with mass numbers,
Week 4	Properties of nuclear forces, Non existence of electrons in the nucleus and neutron-proton model,
Week 5	Liquid drop model and semi empirical mass formula, Conditions of nuclear stability,
Week 6	Fermi gas model. Nuclear shell model. Experimental evidence of magic numbers and its explanation.
Week 7	Radioactivity. Modes of decay and successive radioactivity.
Week 8	Alpha emission. Electron emission, Positron emission. Electron capture
Week 9	Gamma-ray emission, Internal conversion, Qualitative discussion of alpha.
Week 10	beta and gamma spectra, Geiger-Nuttal rule, Neutrino hypothesis of beta decay
Week 11	Evidence of existence of neutrino, Qualitative discussion of alpha and beta decay theories
Week 12	Nuclear reactions. Reaction cross section, Conservation laws. Kinematics of nuclear reaction,
Week 13	Q-value and its physical significance, Compound nucleus, Possible reaction with high energy particles

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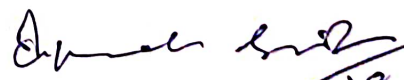
B Sc III (Sem VI)

Subject: CONDENSED MATTER PHYSICS-II


Tentative lesson plan from March 2023 to June 2023

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Lattice vibrations, Concepts of phonons,
Week 2	Scattering of protons by phonons
Week 3	Vibration of mono-atomic,
Week 4	Vibration of di-atomic, linear chains Density of modes,
Week 5	Einstein and Debye models of specific heat
Week 6	Free electron model of metals. Free electron,
Week 7	Fermi gas and Fermi energy.
Week 8	Band theory, Kronig-Penney Model. Metals and insulators,
Week 9	Conductivity and its variation with temperature in semiconductors,
Week 10	Fermi levels in intrinsic and extrinsic semiconductors
Week 11	Qualitative discussion of band gap in semiconductors,
Week 12	superconductivity, Magnetic field effect in superconductors
Week 13	BCS theory. Thermal properties of superconductors


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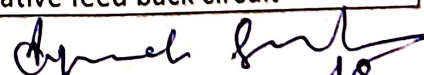
B Sc III (Sem VI)

Subject: Electronics -II

Tentative lesson plan from March 2023 to June 2023

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Thyristor, SCR, TRIAC, DIAC: Construction, Characteristics and Operation;
Week 2	Comparison between transistors and thyristors; Difference between SCR and TRIAC
Week 3	UJT: its construction, Equivalent circuit, Characteristics and parameters, uses
Week 4	Thermistor: Types, Construction, Characteristics, Uses,
Week 5	Advantages over other temperature sensing devices, IMPATT and TRAPATT devices,
Week 6	PIN diode: Construction, Characteristics, Applications
Week 7	Gunn effect and diodes: Mechanism, Characteristic, Negative differential resistivity
Week 8	Domain formation, Tunnel diode: Tunneling Phenomenon, Operation,
Week 9	Applications. Merits and Drawbacks , Transistor biasing: Stabilization of operating point,
Week 10	Fixed bias, Collector to base bias, Bias circuit with emitter resistor, Voltage divider biasing circuit
Week 11	CE amplifier: Working and analysis using h-parameters, Equivalent circuits, Determination of current gain,
Week 12	Power gain, Input impedance, FET amplifier: Voltage Current and Power gain ,
Week 13	Feed back in amplifiers: Types & advantage of negative feedback. Emitter follower as negative feed back circuit


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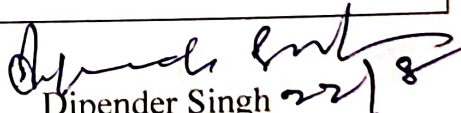
B Sc III (Sem VI)

Subject: NUCLEAR AND PARTICLE PHYSICS


Tentative lesson plan from March 2023 to June 2023

Two weeks left for MST tentative and one week for revision/queries for MST.

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Energy loss due to ionization (Bethe's formula), Energy loss of electrons,
Week 2	Bremsstrahlung, Interactions of gamma rays with matter.
Week 3	Radiation loss by fast electrons, Radiation length, Electron-positron annihilation,
Week 4	Cyclotron. Betatron, Qualitative discussion of Synchrotron,.
Week 5	Collider machines and linear accelerator, Ionization chamber,
Week 6	Proportional counter, GM counter, Scintillation counter
Week 7	Solid state detectors, Elementary particles and their masses,
Week 8	Decay modes, Classification of these particles,
Week 9	Types of interactions. Conservation laws and quantum numbers,
Week 10	Concepts of isospin. Strangeness, Parity,
Week 11	Charge conjugation. Antiparticles, Gell-Man method,
Week 12	Decay and strange particles. Particle symmetry,
Week 13	Introduction to quarks and qualitative discussion of the quark model.


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