GOVT COLLEGE ROPAR
PHYSICS DEPARTMENT
SESSION 2018-2019

Class: B Sc II (Sem III)

Subject: STATISTICAL PHYSICS AND THERMODYNAMICS-I

Tentative lesson plan from August 2018 to November 2018

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Basic ideas of statistical physics, Scope of statistical physics, Basic ideas about probability,
Week 2	Distribution of four distinguishable particles in two compartment of equal size.
Week 3	Concept of macro states, microstates, thermodynamic probability.
Week 4	Effects of constraints on the system, Distribution of n particles in two compartments,
Week 5	Deviation from the state of maximum probability, equilibrium state of dynamic system,
Week 6	Distribution of distinguishable n particles in k compartments of unequal sizes
Week 7	Phase space and its division into elementary cells, Three kinds of statistics.
Week 8	The basic approach in the three statistics, Maxwell Boltzman (MB) statistics applied to an ideal gas in equilibrium.
Week 9	Experimental verification of Maxwell Boltzman law of distribution of molecular speeds,
Week 10	Need for quantum statistics-Bose-Einstein (B.E.) statistics,
Week 11	Derivation of Planck's law of radiation, Deduction of Wien's displacement law from Planck's law
Week 12	Deduction of Stefan's law from Planck's law, Fermi-Dirac (F.D.) statistics
Week 13	Comparison of M.B., B.E. and F.D. statistics.

20/7/2018

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PHYSICS DEPARTMENT
SESSION 2018-2019

B.Sc.II (Sem III)

Subject:Optics

Tentative lesson plan from August 2018 to November 2018

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Concept of coherence, Spatial and temporal coherence. Coherence time,
Week 2	Coherence length, Area of coherence, Conditions for observing interference fringes,
Week 3	Interference by wave front division and amplitude division,
Week 4	Michelson's interferometer—working, Principle and nature of fringes,
Week 5	Interference in thin films, Role of interference in anti-reflection and high reflection dielectric coatings
Week 6	Multiple beam interference, Fabry-Perot interferometer, Nature of fringes, Newton Rings.
Week 7	Huygens-Fresnel theory, half-period zones, Zone plates,
Week 8	Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at rectangular and circular apertures,.
Week 9	Effects of diffraction in optical imaging, resolving power of telescope.
Week 10	The diffraction grating, its use as a spectroscopic element and its resolving power
Week 11	Concept and analytical treatment of un-polarized, plane polarized and elliptically polarized light
Week 12	Double refraction, Nicol prism, Sheet polarizer, Retardation plates
Week 13	Production and analysis of polarized light (quarter and half wave plates).

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PHYSICS DEPARTMENT
SESSION 2018-2019

B.Sc.II (Sem III)

Subject:Quantum Mechanics-I

Tentative lesson plan from August 2018 to November 2018

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Brief introduction to need and development of quantum mechanics, Wave-particle,
Week 2	dualityde-Broglie hypothesis, Complimentarity and uncertainty principle
Week 3	Gaussian wave-packet Schrodinger equation for a free particle,
Week 4	operator correspondence and equation for a particle subject to forces ,Normalization and probability,
Week 5	Interpretation of wave function, Super position principle, Expectation value,
Week 6	probability current and conservation of probability Admissibility conditions on the wave function
Week 7	Ehrenfest theorem, Fundamental postulates of wave mechanics,
Week 8	Eigen functions and eigen values. Operator formalism, Orthogonal systems,
Week 9	Expansion in eigen functions Hermitian operators,Simultaneous eigen functions.
Week 10	Equation of motion,Time dependent Schrodinger equation. Application to stationary states for one dimension
Week 11	Potential step, Potential barrier, Rectangular potential well, Degeneracy,
Week 12	Orthogonality, Linear harmonic oscillator, Schrodinger equation for spherically symmetric potential,
Week 13	Spherical harmonics. Hydrogen atom energy levels and eigen functions. Degeneracy, Angular momentum

02/08/2018

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PHYSICS DEPARTMENT
SESSION 2018-2019

Class: B Sc II (Sem IV)

Subject: STATISTICAL PHYSICS AND THERMODYNAMICS-II

Tentative lesson plan from March 2019 to June 2019

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Statistical definition of entropy, Change of entropy of a system, Additive nature of entropy,
Week 2	Law of increase of entropy, Reversible and irreversible process and their examples.
Week 3	Work done in a reversible process. Examples of increase of entorpy in natural processes,
Week 4	Entropy and disorder, Brief review of terms and laws of thermodynamics,
Week 5	Carnot's cycle,Entropy changes in Carnot cycle. Applications of thermodynamics to thermoelectric effect.
Week 6	Change of entropy along a reversible path in a P.V. diagram, Entropy of a perfect gas
Week 7	Equation of state of an ideal gas from simple statistical consideration, Heat death of the universe.
Week 8	Derivation of Maxwell's thermo dynamical relations, Cooling produced by adiabatic streching,
Week 9	Adiabatic compression, Change of internal energy with volume,
Week 10	specific heat at constant pressure and constant volume,
Week 11	Expression for Cp -Cv , Change of state and Clayperon equation,
Week 12	Thermo dynamical treatment of Joule-Thomson effect, Use of Joule-Thomson effect,
Week 13	Liquefication of helium. ,Production of very low temperature by adiabatic demagnetization.

10/04/2018

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PHYSICS DEPARTMENT
SESSION 2018-2019

B.Sc.II (Sem IV)

Subject:Lasers

Tentative lesson plan from March 2019 to June 2019

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Derivation of Einstein's relations. Concept of stimulated emission and population inversion
Week 2	Broadening of spectral lines, natural broadening.
Week 3	collision and Doppler broadening ,Line width, Line profile,.
Week 4	Absorption and amplification of a parallel beam of light passing through a medium
Week 5	Threshold condition, Introduction of three level and four level laser schemes
Week 6	Elementary theory of optical cavity, Longitudinal and transverse modes.
Week 7	**Laser Systems :** types of lasers, Ruby laser- construction, mode of creating population inversion and output characterstics
Week 8	Nd: YAG laser - construction, mode of creating population inversion and output characterstics
Week 9	He-Ne laser - construction, mode of creating population inversion and output characterstics
Week 10	CO_2 laser- construction, mode of creating population inversion and output characterstics.
Week 11	Semiconductor lasers, Dye lasers,
Week 12	Q-switching, Mode locking,
Week 13	Applications of lasers–a general outline. Basics of holography.

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PHYSICS DEPARTMENT
SESSION 2018-2019

B.Sc.II (Sem IV)

Subject: QUANTUM MECHANICS-II

Tentative lesson plan from March 2019 to June 2019

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

TIME PERIOD	TOPICS TO BE COVERED
Week 1	Excitation of atom with radiation. Transition probability, Spontaneous transition,
Week 2	Selection rules and life time, Spectrum of hydrogen atom. Frank Hertz Experiment,
Week 3	Line structure, Normal Zeeman effect, Electron spin, Stern Gerlach experiment,
Week 4	Spin orbit coupling (electron magnetic moment, total angular momentum),
Week 5	Hyperfine structure, Examples of one electron systems,
Week 6	Anomalous,Zeeman effect, Lande-g factor (sodium D-lines).
Week 7	**Many Electron System Spectra**: Exchange symmetry of wave functions, exclusion principle,
Week 8	Shells, Sub shells in atoms, atomic spectra (Helium),
Week 9	L.S. coupling ,Selection rules, Regularities in atomic spectra,
Week 10	Interaction energy, X-ray spectra, Mosley law
Week 11	Absorption spectra, Auger effect. Molecular bonding,.
Week 12	Molecular spectra, Selection rules, Symmetric structures, Rotational,
Week 13	Vibration electronic level and spectra of molecules, Raman spectra

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