***Tentative Lesson Plan***

*Name of the Faculty:- Kamaljeet Singh*

*Class and Section: B.Sc 6thSem Section-A*

*Subject:- Solid State Physics and Nano Science*

***April 2022***

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| *Topics* |
| *Unit 1:-Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis Winger Seitz primitive Cell*  *crystal translational vectors and axes. Unit cell and Primitive Cell,* |
| *symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions* |
| *Crystal planes and Miller indices, Interplaner spacing, Crystal*  *structures of Zinc Sulphide, Sodium Chloride and Diamond* |
| *Assignment-1* |

***May 2022***

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| *Topics* |
| *X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space* |
| *reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c.* |
| *group discussion and numerical solving, Assignment/seminar* |
| *Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect,*  *Class Test-1* |

***June 2022***

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| *Topics* |
| *Critical Magnetic Field, Meissner Effect, London Theory and Pippards’ equation,*  *Classification of Superconductors (type I and Type II),* |
| *BCS Theory of Superconductivity, Flux quantization, Josephson Effect* |
| *Practical Applications of superconductivity and their limitations, power application of superconductors* |
| *Definition, Length scale, Importance of Nano-scale and technology, History of Nanotechnology, Benefits and challenges in molecular manufacturing*  *Assignment-2* |

***July 2022***

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| *Topics* |
| *Molecular assembler concept*  *Understanding advanced capabilities. Vision and objective of Nano-technology,* |
| *Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology,*  *Materials, Medicine* |
| *Revision* |

⁹Lesson Plan(Theory)

2021-22 even semester

Name of the Assistant Professor:-Mr. Mukesh

Class and Section:B.Sc. 4thSem Section-B

Subject:- Waves and Optics II

Days:- Thr, Fri, Sat

**April 2022**

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| Week | Topics |
| 1st | Polarisation by reflection, refraction and scattering, Malus Law,  Phenomenon of double refraction, Huygen's wave theory of double refraction |
| 2nd | Analysis of polarized Light. Nicol prism, Quarter wave plate and  half wave plate, production and detection of (i) Plane polarized light (ii) Circularly  Polarized light and (iii) Elliptically polarized light. Optical activity, |
| 3rd | Fresnel's theory of optical rotation, Specific rotation,  Polarimeters (half shade and Biquartz). |
| 4th | Assignment-I and Class Test |

**May2022**

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| Week | Topics |
| 1st | Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem |
| 2nd | even and odd functions, Fourier series of functions f(x)  between (i) 0 to 2pi, (ii) –pi to pi, (iii) 0 to pi, (iv) –L to L, complex form of Fourier series |
| 3rd | Application of Fourier theorem for analysis of complex waves: solution of  triangular and rectangular waves , half and full wave rectifier outputs, |
| 4th | Parseval identity for Fourier Series, Fourier integrals  Fourier Transform and its properties Assignment-II |

**June 2022**

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| Week | Topics |
| 1st | Application of Fourier transform (i) for evaluation of integrals  (ii) for solution of ordinary differential equations,  (iii) to the following  functions:  1. f(x)= e- x2/2  2 . f(x) = 1 |
| 2nd | Matrix methods in paraxial optics, effects of translation and refraction |
| 3rd | derivation of thin lens and thick lens formulae,  unit plane, nodal planes, system of thin lenses. |
| 4th | Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies. Optical fiber, Critical angle of propagation, Mode of Propagation, |

**July 2022**

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| Week | Topics |
| 1st | Acceptance angle, Fractional refractive index change, Numerical aperture  Types of optics fiber, Normalized frequency, Pulse dispersion |
| 2nd | Attenuation, Applications, Fiber optic Communication, |
| 3rd | Revision of previous year papers |

Lesson Plan(Theory)

2021-22 even semester

Name of the Assistant Profesor:-Mr. Mukesh

Class and Section: B.Sc 4thSem Section-A

Subject:- Statistical Physics

Days- Mon, Tue, Wed **April 2022**

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| Week | Topics |
| 1st | Microscopic and Macroscopic systems, events-mutually exclusive, dependent and  independent. Probability, statistical probability, A- priori Probability and relation  between them, probability theorems, some probability considerations |
| 2nd | combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3, any number of Coins, Permutations & combinations, distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, |
| 3rd | Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes, |
| 4th | Condition of equilibrium between two systems in thermal contact-- β  parameter, Entropy and Probability (Boltzman's relation). Assignment-I |

**May2022**

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| Week | Topics |
| 1st | Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics, basic approach in three statistics. M. B. statistics applied to and ideal gas in equilibrium |
| 2nd | energy distribution law (including evaluation of ơ and β ) , speed distribution law & velocity distribution law. Expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity, most probable energy & mean energy for Maxwellian distribution Class Test |
| 3rd | Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas, |
| 4th | Degeneracy and B.E. Condensation, Fermi-Dirac energy distribution law, F.D. gas and Degeneracy |

**June 2022**

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| Week | Topics |
| 1st | Fermi energy and Fermi temperature,Fermi Dirac energy distribution law for electron gas in metals, Assignment-II |
| 2nd | Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas,  Specific heat anomaly of metals and its solution. |
| 3rd | M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics. |
| 4th | Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. Specific heat at low temperature, |

**July 2022**

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| Week | Topics |
| 1st | Einstein theory of specific heat, Criticism of Einstein theory, |
| 2nd | Debye model of specific heat of solids, success and shortcomings of Debye theory,  comparison of Einstein and Debye theories. |
| 3rd | Revision of previous years question papers |

***Tentative Lesson Plan***

*Name of the Faculty.:- Dr. Narender*

*Class and Section:- B.Sc 6thSem Section-A & C*

*Subject:- Atomic and Molecular spectroscopy*

*April 2022*

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| *Topics* |
| *Introduction of Unit-1(historical background of atomic spectroscopy)* |
| *Emission and absorpt Bohr’s atomic model(bohr’s postulates), spectra of hydrogen atom ion spectra, wave number, spectrum of hydrogen atom in balmer series, explanation of spectral series in Hydrogen atom, un-quantized states and continuous spectra, spectral series in absorption spectra.(numerical practice* |
| *effect of nuclear motion on line spectra (correction of finite nuclear mass), variation in Rydberg constant due to finite mass. short comings of Bohr’s theory, Wilson sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law*  *Assignment-1* |

*May 2022*

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| *Topics* |
| *Bohr’s corresponding principle, Sommerfeld’s extension of Bohr’s model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory, Vector atom model(V.A.M.)space quantization, electron spin,transition probability and selection rules.* |
| *coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with V.A.M Doubts and problem class of unit-1, test of unit-1* |
| *Unit –II: Vector Atom Model (single valance electron) Orbital magnetic dipole moment (Bohr magneton), behavior of magnetic dipole in external magnetic filed; Larmors’ precession and theorem. Penetrating and Non-penetrating orbits,* |
| *Penetrating orbits on the classical model; Quantum defect spin orbit interaction energy of the single valance electron, spin orbit interaction for penetrating and non-penetrating orbits. quantum mechanical relativity correction, Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation,*  *Class test-1* |

*June 2022*

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| *Topics* |
| *term series and limits Absorption spectra of Alkali atoms. observed doublet fine structure in the spectra of alkali metals and its Interpretation Rydeburg-Ritze combination principle, Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum ,Doubts and problems discussion class, Assignment of unit -2* |
| *UNIT-III: Vector Atom model (two valance electrons)*  *Essential features of spectra of Alkaline-earth elements, V.M. for two valance e- atom: application of spectra. Coupling Schemes;LS or Russell – Saunders Coupling Scheme and JJ coupling scheme,*  *Interaction energy in L-S coupling* |
| *Interaction energy in L-S coupling (sp, pd configuration), Lande interval rule Pauli principal and periodic classification of the elements. Interaction energy in JJ Coupling energy in JJ Coupling (sp, pd configuration)Interaction equivalent and non-equivalent electrons, Two valance electron system-spectral terms of non-equivalent and equivalent electrons* |
| *comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin Unit –IV: Atom in External Field Zeeman Effect (normal and Anomalous) Experimental set-up for studying Zeeman effect, Explanation of normal Zeeman effect(classical and quantum)*  *Assignment-2* |

*July 2022*

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| *Topics* |
| *mechanical Explanation of normal Zeeman effect ,introduction of anomalous Zeeman effect ,Explanation of anomalous Zeeman effect(Lande g-factor) Zeeman pattern of D1 and D2 lines of Na atom, (numerical s practice) Paschen-Back effect of a single valence electron system* |
| *. Weak field Stark effect of Hydrogen atom. Molecular Physics ,introduction,General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra ,Rotational model(IR and Microwave Region), Vibrational Spectra (IR Region) Rotator Model of DiatomicMolecules* |
| *, Raman Effect (classical and quantum explanation) Electronic Spectra , Numerical practice* |

**Tentative Lesson Plan**

Name of the faculty:- Mr. Ashish Kumar

Class and Section:-B.Sc. 2nd semester (Section A & D)

Subject:-Physics ( Properties of Matter and Kinetic Theory of Gases)

**April 2022**

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| Topics |
| Introduction to syllabus **Unit I**: Moment of inertia: Rotation of rigid body, Moment of inertia, Torque, |
| angular momentum, Kinetic energy of rotation, Theorem of perpendicular and parallel axes (with proof), Moment of inertia of solid sphere, |
| hollow sphere, Moment of Inertia of spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross – section, |
| Fly wheel, moment of Inertia of an irregular body  Assignment-1 |

**May 2022**

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| Topics |
| Acceleration of a body rolling down on an inclined plane, Group discussion/ Numerical Problems |
| **Unit 2**: Elasticity: Elasticity, Stress and Strain, Hook’s law, Elastic constant and their relations ,Poisson’s ratio, |
| Torsion of cylinder and twisting couple ,Determination of coefficient of modulus of rigidity for the material of wire by Maxwell’s needle, |
| Bending of beam (Bending moment and its magnitude), Cantilever, Centrally loaded beam  Class test-1 |

**June 2022**

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| Topics |
| Determination of Young’s modulus for the material of the beam, Determination of Elastic constants for the material of the wire by Searle’s method |
| Unit Test **Unit 3**: Kinetic theory of gases -I: Assumption of Kinetic theory of gases, |
| Vacations |
| pressure of an ideal gas, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and its application for specific heat of gases |
| Real gases, Vander wall’s equation, Vander wall’s equation, Brownian motion  Asignment-2 |

**July 2022**

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| Topics |
| Group discussion/ Numerical Problems  **Unit 4**: Kinetic theory of gases -II: Maxwell’s distribution of speed |
| Maxwell’s distribution of speed (derivation),Maxwell’s distribution of velocities (derivation ), |
| Experimental verification of Maxwell’s law of speed distribution ,most probable speed, average and r.m.s. speed, Mean free path, Transport phenomenon, Transport of energy and momentum, Diffusion of gases, |

**Tentative Lesson Plan**

Name of the faculty:- MR. Yashpal

Class and Section:-B.Sc. 2nd semester (section – A & D)

Subject:-Physics (Semiconductor Device)

**April 2022**

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| Topics |
| Introduction to syllabus, origin and background of semiconductors ,UNIT-1:- Energy bands in solids and Intrinsic semi conductors, Doping and extrinsic semiconductors |
| carrier mobility, electrical resistivity of semiconductors, Hall effect and p-n junction diode, Biasing and Characteristics of p-n diode |
| Zener and Avalanche breakdown, Zener diode, Light emitting diodes (LED), Photodiode, Solar Cell, P-n junction as half wave and full wave rectifiers  Assignment-1 |

**May 2022**

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| Topics |
| Filters (series inductor, shunt capacitance, L-section or choke), п and R.C. filter circuits, Doubt and problem solving class |
| Test of UNIT 1 , UNIT-2:- Junction transistors, Working of NPN and PNP transistors, Three configurations of  transistor (C-B, C-E, C-C modes),Characteristics of Common base |
| Characteristics of common emitter transistor, characteristics of common collector transistor, Constants of a transistor and their relation,  Advantages and disadvantages of C-E configuration. |
| D.C. load line and Transistor biasing, Simple, Fixed and emitter feedback biasing circuits, Emitter bias and Voltage divider biasing circuits  Class test-1 |

**June 2022**

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| Topics |
| Assignment from UNIT-2, Unit-3 Amplifiers, Classification of amplifiers, common base and common emitter amplifier |
| coupling of amplifiers, various methods of coupling, R-C coupled amplifier, frequency response graph and band width |
| Vacations |
| Feedback in amplifiers, advantages of negative feedback, A.c. amplifier with negative feedback |
| emitter follower, distortion in amplifiers.,  Assignment-2 |

**July 2022**

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| Topics |
| Test of UNIT-3, Unit-4Oscillators, Principle of oscillation, classification of oscillators, |
| Condition for self  sustained oscillation: Barkhausen criterion for oscillation, common base andcommon emitter collector tuned oscillators |
| Hartley and colpit oscillators, C.R.O. (Principle and Working) |
| Doubt and problem solving class, Revision |

**Tentative Lesson Plan**

Name of the faculty:- Mrs. Rachna

Class and Section:-B.Sc. 2nd semester (section - B & C)

Subject:-Physics (Semiconductor Device)

**April 2022**

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| Topics |
| Introduction to syllabus, origin and background of semiconductors ,UNIT-1:- Energy bands in solids and Intrinsic semi conductors, Doping and extrinsic semiconductors |
| carrier mobility, electrical resistivity of semiconductors, Hall effect and p-n junction diode, Biasing and Characteristics of p-n diode |
| Zener and Avalanche breakdown, Zener diode, Light emitting diodes (LED), Photodiode, Solar Cell, P-n junction as half wave and full wave rectifiers  Assignment-1 |

**May 2022**

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| Topics |
| Filters (series inductor, shunt capacitance, L-section or choke), п and R.C. filter circuits, Doubt and problem solving class |
| Test of UNIT 1 , UNIT-2:- Junction transistors, Working of NPN and PNP transistors, Three configurations of  transistor (C-B, C-E, C-C modes),Characteristics of Common base |
| Characteristics of common emitter transistor, characteristics of common collector transistor, Constants of a transistor and their relation,  Advantages and disadvantages of C-E configuration. |
| D.C. load line and Transistor biasing, Simple, Fixed and emitter feedback biasing circuits, Emitter bias and Voltage divider biasing circuits  Class test-1 |

**June 2022**

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| Topics |
| Assignment from UNIT-2, Unit-3 Amplifiers, Classification of amplifiers, common base and common emitter amplifier |
| coupling of amplifiers, various methods of coupling, R-C coupled amplifier, frequency response graph and band width |
| Vacations |
| Feedback in amplifiers, advantages of negative feedback, A.c. amplifier with negative feedback |
| emitter follower, distortion in amplifiers.,  Assignment-2 |

**July 2022**

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| Topics |
| Test of UNIT-3, Unit-4Oscillators, Principle of oscillation, classification of oscillators, |
| Condition for self  sustained oscillation: Barkhausen criterion for oscillation, common base andcommon emitter collector tuned oscillators |
| Hartley and colpit oscillators, C.R.O. (Principle and Working) |
| Doubt and problem solving class, Revision |

**Tentative Lesson Plan**

Name of the faculty:- Ms. Reena Rani

Class and Section:-B.Sc. 2nd semester (Section B)

Subject:-Physics (Properties of Matter and Kinetic Theory of Gases)

**April 2022**

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| Topics |
| Introduction to syllabus **Unit I**: Moment of inertia: Rotation of rigid body, Moment of inertia, Torque, |
| angular momentum, Kinetic energy of rotation, Theorem of perpendicular and parallel axes (with proof), Moment of inertia of solid sphere, |
| hollow sphere, Moment of Inertia of spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross – section, |
| Fly wheel, moment of Inertia of an irregular body  Assignment-1 |

**May 2022**

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| Topics |
| Acceleration of a body rolling down on an inclined plane, Group discussion/ Numerical Problems |
| **Unit 2**: Elasticity: Elasticity, Stress and Strain, Hook’s law, Elastic constant and their relations ,Poisson’s ratio, |
| Torsion of cylinder and twisting couple ,Determination of coefficient of modulus of rigidity for the material of wire by Maxwell’s needle, |
| Bending of beam (Bending moment and its magnitude), Cantilever, Centrally loaded beam  Class test-1 |

**June 2022**

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| Topics |
| Determination of Young’s modulus for the material of the beam, Determination of Elastic constants for the material of the wire by Searle’s method |
| Unit Test **Unit 3**: Kinetic theory of gases -I: Assumption of Kinetic theory of gases, |
| Vacations |
| pressure of an ideal gas, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and its application for specific heat of gases |
| Real gases, Vander wall’s equation, Vander wall’s equation, Brownian motion  Assignment-2 |

**July 2022**

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| Topics |
| Group discussion/ Numerical Problems  **Unit 4**: Kinetic theory of gases -II: Maxwell’s distribution of speed |
| Maxwell’s distribution of speed (derivation),Maxwell’s distribution of velocities (derivation ), |
| Experimental verification of Maxwell’s law of speed distribution ,most probable speed, average and r.m.s. speed, Mean free path |
| Transport phenomenon, Transport of energy and momentum, Diffusion of gases, Group discussion/ Numerical Problems |

**Tentative Lesson Plan**

Name of the faculty:- Ms. Reena Rani

Class and Section:-B.Sc. 4TH semester (Section C)

Subject:-Physics (WAVE AND OPTICS-II)

**April 2022**

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| Topics |
| Introduction of **unit first** (Polarization),Polarization: Polarisation by reflection, refraction and scattering, Malus Law |
| Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, |
| production and detection of (i) Plane polarized light (ii) Circularly polarized light, Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation |
| Specific rotation, Polarimeters (half shade and Biquartz)  Assignment-1 |

**May 2022**

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| Topics |
| **Unit-2** Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem, even and odd functions, Fourier series of functions f(x) between (i) 0 to 2pi, (ii) –pi to pi, (iii) 0 to pi, |
| –L to L, complex form of Fourier series, Application of Fourier theorem for analysis of complex waves: solution of triangular wave, rectangular waves , |
| half and full wave rectifier outputs, Parseval identity for Fourier Series, Fourier integrals |
| Numerical problems  Class test-1 |

**June 2022**

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| Topics |
| **Unit-3** Unit introduction , Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals |
| solution of ordinary differential equations, (iii) to the following functions:  1. f(x)= e- x2/2    2 . f(x) = 1 |X|<a   1. |X |>a   Matrix methods in paraxial optics |
| Vacations |
| effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses  Assignment-2 |

**July 2022**

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| Topics |
| **Unit-4** Chromatic aberrations, Spherical aberration, Coma, astigmatism, |
| Distortion, aberrations and their remedies,Optical fiber, Critical angle of propagation, |
| Mode of Propagation, Acceptance angle, Fractional refractive index change |
| Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation |
| Applications, Fiber optic Communication, Advantages, Doubt class, Revision |

**Tentative Lesson Plan**

Name of the faculty:- Dr. Balkrishna Kandpal

Class and Section:-B.Sc. 2nd semester (Section C)

Subject:-Physics ( Properties of Matter and Kinetic Theory of Gases)

**April 2022**

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| Topics |
| Introduction to syllabus **Unit I**: Moment of inertia: Rotation of rigid body, Moment of inertia, Torque, |
| angular momentum, Kinetic energy of rotation, Theorem of perpendicular and parallel axes (with proof), Moment of inertia of solid sphere, |
| hollow sphere, Moment of Inertia of spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross – section, |
| Fly wheel, moment of Inertia of an irregular body  Assignment-1 |

**May 2022**

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| Topics |
| Acceleration of a body rolling down on an inclined plane, Group discussion/ Numerical Problems |
| **Unit 2**: Elasticity: Elasticity, Stress and Strain, Hook’s law, Elastic constant and their relations ,Poisson’s ratio, |
| Torsion of cylinder and twisting couple ,Determination of coefficient of modulus of rigidity for the material of wire by Maxwell’s needle, |
| Bending of beam (Bending moment and its magnitude), Cantilever, Centrally loaded beam  Class test-1 |

**June 2022**

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| Topics |
| Determination of Young’s modulus for the material of the beam, Determination of Elastic constants for the material of the wire by Searle’s method |
| Unit Test **Unit 3**: Kinetic theory of gases -I: Assumption of Kinetic theory of gases, |
| Vacations |
| pressure of an ideal gas, Ideal Gas equation, Degree of freedom, Law of equipartition of energy and its application for specific heat of gases |
| Real gases, Vander wall’s equation, Vander wall’s equation, Brownian motion  Assignment-2 |

**July 2022**

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| Topics |
| Group discussion/ Numerical Problems  **Unit 4**: Kinetic theory of gases -II: Maxwell’s distribution of speed |
| Maxwell’s distribution of speed (derivation),Maxwell’s distribution of velocities (derivation ), |
| Experimental verification of Maxwell’s law of speed distribution ,most probable speed, average and r.m.s. speed, Mean free path |
| Transport phenomenon, Transport of energy and momentum, Diffusion of gases, Group discussion/ Numerical Problems |

**Tentative Lesson Plan**

Name of the faculty:- Dr. Balkrishna Kandpal

Class and Section:-B.Sc. 4th semester (section – A)

Subject:-Physics (Wave and Optics II **)**

**April 2022**

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| Topics |
| Introduction of **unit first** (Polarization),Polarization: Polarisation by reflection, refraction and scattering, Malus Law |
| Phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, |
| production and detection of (i) Plane polarized light (ii) Circularly polarized light, Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation |
| Specific rotation, Polarimeters (half shade and Biquartz)  Assignment-1 |

**May 2022**

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| Topics |
| **Unit-2** Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem, even and odd functions, Fourier series of functions f(x) between (i) 0 to 2pi, (ii) –pi to pi, (iii) 0 to pi, |
| –L to L, complex form of Fourier series, Application of Fourier theorem for analysis of complex waves: solution of triangular wave, rectangular waves , |
| half and full wave rectifier outputs, Parseval identity for Fourier Series, Fourier integrals |
| Numerical problems  Class test-1 |

**June 2022**

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| Topics |
| **Unit-3** Unit introduction , Fourier transforms and its properties, Application of Fourier transform (i) for evaluation of integrals |
| solution of ordinary differential equations, (iii) to the following functions:  1. f(x)= e- x2/2  2 . f(x) = 1 |X|<a   1. |X |>a   Matrix methods in paraxial optics |
| Vacations |
| effects of translation and refraction, derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses |
| **Unit-4** Chromatic aberrations, Spherical aberration, Coma, astigmatism,  Assignment-2 |

**July 2022**

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| Topics |
| **Unit-4** Chromatic aberrations, Spherical aberration, Coma, astigmatism, |
| Distortion, aberrations and their remedies,Optical fiber, Critical angle of propagation, |
| Mode of Propagation, Acceptance angle, Fractional refractive index change |
| Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation |
| Applications, Fiber optic Communication, Advantages, Doubt class, Revision |

Tentative Lesson Plan

Name of the faculty:- Seema Chopra

Class and Section:--B.Sc. 4thSem (Section-B & C)

Subject:- Statistical Physics

**April 2022**

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| Topics |
| Introduction of **Unit-I**(statistical Physics), Microscopic and Macroscopic systems, events-mutually exclusive,dependent and independent, Probability, statistical probability, a priori probability and relation between them |
| probability theorems, some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations, distributions of N (for N= 2,3,4) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macrostates |
| Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations, general distribution of distinguishable particles in compartments of different sizes, Condition of equilibrium between two systems in thermal contact-- β parameter, Entropy and Probability (Boltzman's relation). |
| Group discussion and numerical solving,  Assignment-1 |

**May 2022**

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| Topics |
| Introduction of Unit-II(statistical Physics) Postulates of statistical physics, Phase space, Division of Phase space into cells, three kinds of statistics,, basic approach in three statistics, Maxwell Boltzman statistics applied to an ideal gas in equilibrium |
| Determination of unknown constants ơ and β,Maxwell Boltzman distribution law of speed, Discuss and graphical representation of Maxwell's speed distribution law, Maxwell Boltzman velocity distribution law, |
| Discussion of Maxwell velocity prbability distribution function, Expression for average speed, r.m.s. speed, average velocity, r. m. s. velocity,most probable energy & mean energy for Maxwellian distribution. |
| group discussion and numerical solving,  Class test-1 |

**June 2022**

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| Topics |
| Introduction of **Unit-III**(Quantum statistics), Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of Bose-Einstien statistics to Planck's radiation law |
| Bose-Einstien gas, Degeneracy and B.E. Condensation |
| Holiday |
| Fermi Dirac energy distribution law, F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron  gas in metals, Zero point energy  Assignment-2 |

**July 2022**

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| Topics |
| Zero point pressure and average speed (at 0 K) of  electron gas, Specific heat anomaly of metals and its solution, M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics |
| Introduction of **Unit-IV**(Theory of specific heat of solids), Dulong and Petit law. Derivation of Dulong and Petit law from classical physics. |
| Specific heat at low temperature, Einstein theory of specific heat, |
| Debye model of specific heat of solids, Success and shortcomings of Debye theory, comparison of Einstein and Debye theories. |

***Tentative Lesson Plan***

*Name of the Faculty:- Renu Jakhar*

*Class and Section: B.Sc 6thSem Section-B*

*Subject:- Solid State Physics and Nano Science*

***April 2022***

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| *Topics* |
| *Unit 1:-Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis Winger Seitz primitive Cell*  *crystal translational vectors and axes. Unit cell and Primitive Cell,* |
| *symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions* |
| *Crystal planes and Miller indices, Interplaner spacing, Crystal*  *structures of Zinc Sulphide, Sodium Chloride and Diamond* |
| *Assignment-1* |

***May 2022***

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| *Topics* |
| *X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space* |
| *reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c.* |
| *group discussion and numerical solving, Assignment/seminar* |
| *Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect,*  *Class Test-1* |

***June 2022***

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| *Topics* |
| *Critical Magnetic Field, Meissner Effect, London Theory and Pippards’ equation,*  *Classification of Superconductors (type I and Type II),* |
| *BCS Theory of Superconductivity, Flux quantization, Josephson Effect* |
| *Practical Applications of superconductivity and their limitations, power application of superconductors* |
| *Definition, Length scale, Importance of Nano-scale and technology, History of Nanotechnology, Benefits and challenges in molecular manufacturing*  *Assignment-2* |

***July 2022***

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| *Topics* |
| *Molecular assembler concept*  *Understanding advanced capabilities. Vision and objective of Nano-technology,* |
| *Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology,*  *Materials, Medicine* |
| *Revision* |

***Tentative Lesson Plan***

*Name of the Faculty.:- Renu Jakhar*

*Class and Section:- B.Sc 6thSem Section-B*

*Subject:- Atomic and Molecular spectroscopy*

*April 2022*

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| *Topics* |
| *Introduction of Unit-1(historical background of atomic spectroscopy)* |
| *Emission and absorpt Bohr’s atomic model(bohr’s postulates), spectra of hydrogen atom ion spectra, wave number, spectrum of hydrogen atom in balmer series, explanation of spectral series in Hydrogen atom, un-quantized states and continuous spectra, spectral series in absorption spectra.(numerical practice* |
| *effect of nuclear motion on line spectra (correction of finite nuclear mass), variation in Rydberg constant due to finite mass. short comings of Bohr’s theory, Wilson sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law*  *Assignment-1* |

*May 2022*

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| *Topics* |
| *Bohr’s corresponding principle, Sommerfeld’s extension of Bohr’s model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory, Vector atom model(V.A.M.)space quantization, electron spin,transition probability and selection rules.* |
| *coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with V.A.M Doubts and problem class of unit-1, test of unit-1* |
| *Unit –II: Vector Atom Model (single valance electron) Orbital magnetic dipole moment (Bohr magneton), behavior of magnetic dipole in external magnetic filed; Larmors’ precession and theorem. Penetrating and Non-penetrating orbits,* |
| *Penetrating orbits on the classical model; Quantum defect spin orbit interaction energy of the single valance electron, spin orbit interaction for penetrating and non-penetrating orbits. quantum mechanical relativity correction, Hydrogen fine spectra, Main features of Alkali Spectra and their theoretical interpretation,*  *Class test-1* |

*June 2022*

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| *Topics* |
| *term series and limits Absorption spectra of Alkali atoms. observed doublet fine structure in the spectra of alkali metals and its Interpretation Rydeburg-Ritze combination principle, Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum ,Doubts and problems discussion class, Assignment of unit -2* |
| *UNIT-III: Vector Atom model (two valance electrons)*  *Essential features of spectra of Alkaline-earth elements, V.M. for two valance e- atom: application of spectra. Coupling Schemes;LS or Russell – Saunders Coupling Scheme and JJ coupling scheme,*  *Interaction energy in L-S coupling* |
| *Interaction energy in L-S coupling (sp, pd configuration), Lande interval rule Pauli principal and periodic classification of the elements. Interaction energy in JJ Coupling energy in JJ Coupling (sp, pd configuration)Interaction equivalent and non-equivalent electrons, Two valance electron system-spectral terms of non-equivalent and equivalent electrons* |
| *comparison of spectral terms in L-S And J-J coupling. Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin Unit –IV: Atom in External Field Zeeman Effect (normal and Anomalous) Experimental set-up for studying Zeeman effect, Explanation of normal Zeeman effect(classical and quantum)*  *Assignment-2* |

*July 2022*

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| *Topics* |
| *mechanical Explanation of normal Zeeman effect ,introduction of anomalous Zeeman effect ,Explanation of anomalous Zeeman effect(Lande g-factor) Zeeman pattern of D1 and D2 lines of Na atom, (numerical s practice) Paschen-Back effect of a single valence electron system* |
| *. Weak field Stark effect of Hydrogen atom. Molecular Physics ,introduction,General Considerations, Electronic States of Diatomic Molecules, Rotational Spectra ,Rotational model(IR and Microwave Region), Vibrational Spectra (IR Region) Rotator Model of DiatomicMolecules* |
| *, Raman Effect (classical and quantum explanation) Electronic Spectra , Numerical practice* |

***Tentative Lesson Plan***

*Name of the Faculty:- Shweta*

*Class and Section: B.Sc 6thSem Section-C*

*Subject:- Solid State Physics and Nano Science*

***April 2022***

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| *Topics* |
| *Unit 1:-Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis Winger Seitz primitive Cell*  *crystal translational vectors and axes. Unit cell and Primitive Cell,* |
| *symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions* |
| *Crystal planes and Miller indices, Interplaner spacing, Crystal*  *structures of Zinc Sulphide, Sodium Chloride and Diamond* |
| *Assignment-1* |

***May 2022***

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| *Topics* |
| *X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space* |
| *reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c.* |
| *group discussion and numerical solving, Assignment/seminar* |
| *Historical introduction, Survey of superconductivity, Super conducting systems, High Tc Super conductors, Isotopic Effect,*  *Class Test-1* |

***June 2022***

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| *Topics* |
| *Critical Magnetic Field, Meissner Effect, London Theory and Pippards’ equation,*  *Classification of Superconductors (type I and Type II),* |
| *BCS Theory of Superconductivity, Flux quantization, Josephson Effect* |
| *Practical Applications of superconductivity and their limitations, power application of superconductors* |
| *Definition, Length scale, Importance of Nano-scale and technology, History of Nanotechnology, Benefits and challenges in molecular manufacturing*  *Assignment-2* |

***July 2022***

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| *Topics* |
| *Molecular assembler concept*  *Understanding advanced capabilities. Vision and objective of Nano-technology,* |
| *Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology,*  *Materials, Medicine* |
| *Revision* |