

DYAL SINGH COLLEGE, KARNAL

Lesson Plan

session 2017-18

Name of the Assistant Professor Ms. Ambika Rani

Class and Section: B.Sc NM A& B (1st sem & 2nd sem)

Vector background and Electric field, semiconductor devices

Subject:

Week	days	Topics
1	July 15, 17-- 22,2017	Orientation for new comers
2	July 24-29,2017	Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of a vector and their physical significance
3	July 31- Aug 5, 2017	Flux of a vector field, Divergence and curl of a vector and their physical significance, Gauss's divergence theorem
4	Aug. 7- 12,2017	Stoke's theorem. Derivation of electric field E from potential as gradient
5	Aug. 14-19,2017	Derivation of Laplace and Poisson equations, Electric flux, Gauss's Law
6	Aug. 21-26,2017	Mechanical force of charged surface, Energy per unit volume.
7	Aug. 28- Sep. 2,2017	Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction, properties of B
8	Sep. 4-9, 2017	Electronic theory of dia and paramagnetism, Domain theory of ferromagnetism (Langevin's theory)
9	Sep.11-16,2017	Cycle of magnetization- hysteresis, loop (Energy dissipation, Hysteresis loss and importance of Hysteresis Curve)
10	Sep.18-23,2017	Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials
11	Sep.25-30,2017	Boundary conditions at interface between two different media, Poynting vector and Poynting theorem.
12	Oct.3-7, 2017	A.C. circuit analysis using complex variable with (a) Capacitance and Resistance (CR)
13	Oct. 9-14, 2017	(b) Resistance and Inductance (LR) (c) Capacitance and Inductance (LC),and (d) Capacitance, Inductance and Resistance (LCR)
14	Oct. 23-28,2017	numerical problems
15	Oct. 30- Nov.4,2017	Series and parallel resonance circuit, Quality factor (sharpness of resonance).
16	Nov. 6- 13, 2017	revision of syllabus

17	Jan. 1-6,2018	Energy bands in solids, Intrinsic and extrinsic semiconductors, carrier mobility and electrical resistivity of semiconductors
18	Jan. 8-13,2018	Hall effect, p-n junction diode and their characteristics,
19	Jan. 15-20, 2018	Zener and Avalanche breakdown, Zener diode, Zener diode as a voltage regulator
20	Jan. 22-27,2018	Light emitting diodes (LED), Photoconduction in semiconductors, Photodiode, Solar Cell
21	Jan. 29 -Feb 3,2018	p-n junction as a rectifier, half wave and full wave rectifiers
22	Feb 5-10,2018	filters (series inductor, shunt capacitance, L-section or choke, π and R.C. filter circuits)
23	Feb.12-17,2018	Transistors : Junction transistors, Working of NPN and PNP transistors
24	Feb. 19-24,2018	Three configurations of transistor (C-B, C-E, C-C modes),Common base, common emitter and common collector characteristics of transistor
25	Feb. 26-27, 2018	Constants of a transistor and their relation,Advantages and disadvantages of C-E configuration
26	March 5-10,2018	D.C. load line .Transistor biasing; various methods of transistor biasing and stabilization.
27	March, 12-17,2018	Amplifiers, Classification of amplifiers, common base and common emitter amplifiers, coupling of amplifiers
28	March 19-24,2018	various methods of coupling, Resistance- Capacitance (RC), coupled amplifier (two stage, concept of band width, no derivation)
29	March 26-31, 2018	Feedback in amplifiers, advantages of negative feedback, emitter follower, distortion in amplifiers
30	April 2-7, 2018	Oscillators, Principle of oscillation, classification of oscillators
31	April 9- 13,2018	Condition for self sustained oscillation: Barkhausen criterion for oscillation
32	April 16-21, 2018	Tuned collector common emitter oscillator, Hartley oscillator, C.R.O. (Principle and Working).
33	April 23-28,2018	revision of syllabus

R. Arora

DYAL SINGH COLLEGE, KARNAL

2017-18

Lesson Plan

Name of the teacher:

Dr. Devinder Singh

Class and Section:

B.Sc. - 6th Semester (A & B)

Subject:

Solid State and Nano Physics

Week	Date	Topics
1	01.01.2018 to 06.01.2018	Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis.
2	08.01.2018 to 13.01.2018	Crystal translational vectors and axes. Unit cell and Primitive cell, Wigner Seitz primitive cell, Symmetry operations for a two and three dimensional crystal.
3	15.01.2018 to 20.01.2018	Bravais lattices in two and three dimensions. Crystal planes and Miller indices, Interplaner spacing.
4	22.01.2018 to 27.01.2018	Crystal structures of Zinc Sulphide, Sodium Chloride and Diamond.
5	29.01.2018 to 03.02.2018	X-ray diffraction, Bragg's law and experimental X-ray diffraction methods.
6	05.02.2018 to 10.02.2018	K-space and reciprocal lattice and its physical significance.
7	12.02.2018 to 17.02.2018	Reciprocal lattice vectors, need of reciprocal lattice.
8	19.02.2018 to 24.02.2018	Reciprocal lattice to a s.c. lattice, b.c.c. lattice and f.c.c lattice.
9	26.02.2018 to 03.03.2018	Revision, Assignments, Tests.

10	05.03.2018 to 10.03.2018	Historical introduction, Survey of superconductivity, Super conducting systems, High T_c Super conductors.
11	12.03.2018 to 17.03.2018	Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation.
12	19.03.2018 to 24.03.2018	Classification of Superconductors (Type I and Type II), BCS Theory of Superconductivity, Flux quantization.
13	26.03.2018 to 31.03.2018	Josephson Effect (AC and DC), Practical applications of superconductivity and their limitations, Power application of superconductors.
14	02.04.2018 to 07.04.2018	Definition, Length scale, Importance of Nano-scale and technology History of Nanotechnology,
15	09.04.2018 to 14.04.2018	Benefits and challenges in molecular manufacturing. Molecular assembler concept, Understanding advanced capabilities.
16	16.04.2018 to 21.04.2018	Vision and objective of Nano-technology, Nanotechnology in different fields, Automobile.
17	13.04.2018 to 28.04.2018	Nanotechnology in Electronics, Nano-biotechnology, Materials, Medicine.

R. Arora

DYAL SINGH COLLEGE, KARNAL

2017-18

Lesson Plan

Name of the teacher: **Dr. Devinder Singh**
Class and Section: **B.Sc. - 5th Semester (A & B)**
Subject: **Nuclear Physics**

Week	Date	Topics
1	17.07.2017 to 22.07.2017	Introduction, Nuclear composition - proton-electron hypothesis and proton-neutron hypothesis.
2	24.07.2017 to 29.07.2017	Nuclear mass and binding energy, systematics of nuclear binding energy, nuclear stability.
3	31.07.2017 to 05.08.2017	Nuclear size, spin, parity, statistics. Nuclear magnetic dipole moment and quadrupole moment.
4	07.08.2017 to 12.08.2017	Determination of nuclear mass by Bain-Bridge spectrometer, Bain-Bridge and Jordan mass spectrograph, Determination of charge by Mosley Law, Determination of size of nucleus by Rutherford Back Scattering
5	14.08.2017 to 19.08.2017	Alpha-disintegration and its theory. Energetics of alpha-decay. Origin of continuous beta spectrum (neutrino hypothesis), types of beta-decay and energetics of beta-decay.
6	21.08.2017 to 26.08.2017	Nature of gamma rays. Energetics of gamma rays. Interaction of heavy, charged particles (Alpha particles) Energy loss of heavy Charged particle (idea of Bethe formula, no derivation).
7	28.08.2017 to 02.09.2017	Range and straggling of alpha particles. Geiger-Nuttall law. Interaction of light charged particle (beta-particle). Energy loss of beta-particles(ionization). Range of electrons, absorption of beta particles.
8	04.09.2017 to 09.09.2017	Interaction of Gamma Ray: Passage of Gamma radiations through matter (Photoelectric. Compton and pair production effect) electron-positron annihilation. Absorption of Gamma rays (Mass attenuation coefficient) and its application.

9	11.09.2017 to 16.09.2017	Revision, Assignments, Test
10	18.09.2017 to 23.09.2017	Linear accelerator and Tandem accelerator.
11	25.09.2017 to 30.09.2017	Cyclotron and Betatron accelerators,
12	02.10.2017 to 07.10.2017	Ionization chamber, proportional counter. GM. Counter (detailed study),
13	09.10.2017 to 14.10.2017	Scintillation counter and semiconductor detector.
14	23.10.2017 to 28.10.2017	Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, photonuclear reaction, Radiative capture Direct-reaction, Heavy ion reactions and spallation reactions.
15	30.10.2017 to 04.11.2017	Conservation laws, Q-value and reaction Threshold.
16	06.10.2017 to 13.11.2017	Nuclear fission and fusion reactors, (Principle, construction, working and uses).

R. Arora

DYAL SINGH COLLEGE, KARNAL

Lesson Plan		session 2017-18
Name of the Associate Professor		Dr. Rajni Seth
Class and Section:		B.Sc NM A& B
Subject:		Physics : Computer Programming and Thermodynamics, Statistical Physics
Week	days	Topics
1	July 15, 17--22,2017	Computer organization, Binary representation, Algorithm development, Flow charts and their interpretation.
2	July 24-29,2017	FORTTRAN Preliminaries: Integer and floating point arithmetic expression, built in functions
3	July 31- Aug 5, 2017	executable and non-executable statements, input and output statements, Formats, IF, DO and GO TO statements
4	Aug. 7- 12,2017	Dimension arrays, statement function and function subprogram.
5	Aug. 14-19,2017	Algorithm, Flow Chart and Programming for Print out of natural numbers
6	Aug. 21-26,2017	Range of the set of given numbers, Ascending and descending order
7	Aug. 28- Sep. 2,2017	Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation
8	Sep. 4-9, 2017	Product of two matrices, Numerical integration (Trapezoidal rule and Simpson 1/3 rule) .
9	Sep.11-16,2017	Thermodynamic system and Zeroth law of thermodynamics. First law of thermodynamics and its limitations, reversible and irreversible process.
10	Sep.18-23,2017	Second law of thermodynamics and its significance, Carnot theorem, Absolute scale of temperature, Absolute Zero and magnitude of each division on work scale and perfect gas scale

11	Sep.25-30,2017	Joule's free expansion, Joule Thomson effect, Joule-Thomson (Porous plug) experiment, conclusions and explanation, analytical treatment of Joule Thomson effect.
12	Oct.3-7, 2017	Entropy, calculations of entropy of reversible and irreversible process , T-S diagram, entropy of a perfect gas, Nernst heat law(third law of thermodynamics)
13	Oct. 9-14, 2017	Liquefaction of gases, (oxygen, air, hydrogen and helium), Solidification of He below 4K, Cooling by adiabatic demagnetization.
14	Oct. 23-28,2017	Derivation of Clausius-Clapeyron and Clausius latent heat equation and their significance,specific heat of saturated vapours,phase diagraph and triple point of a substance, development of Maxwell thermodynamical relations
15	Oct. 30- Nov.4,2017	Thermodynamical functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them, derivation of Maxwell thermodynamical relations from thermodynamical functions
16	Nov. 6- 13, 2017	Application of Maxwell relations, derivation of Stefans law, adiabatic compression and expansion of gas & deduction of theory of Joule Thomson effect.
17	Jan. 1-6,2018	Microscopic and Macroscopic systems, events-mutually exclusive, dependent and independent. Probability, statistical probability, A-priori Probability and relation between them, probability theorems
18	Jan. 8-13,2018	some probability considerations, combinations possessing maximum probability, combination possessing minimum probability, Tossing of 2,3 and any number of Coins, Permutations and combinations

19	Jan. 15-20, 2018	distributions of $N = 2,3,4$) distinguishable and indistinguishable particles in two boxes of equal size, Micro and Macro states, Thermodynamical probability, Constraints and Accessible states, Statistical fluctuations
20	Jan. 22-27,2018	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)
21	Jan. 29 -Feb 3,2018	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 an ideal gas in equilibrium
22	Feb 5-10,2018	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
23	Feb.12-17,2018	Need for Quantum Statistics: Bose-Einstein energy distribution law, Application of B.E. statistics to Planck's radiation law B.E. gas,
24	Feb. 19-24,2018	F.D. gas and Degeneracy, Fermi energy and Fermi temperature, Fermi Dirac energy distribution law, Fermi Dirac gas and degeneracy,
25	Feb. 26-27, 2018	Zero point energy, Zero point pressure and average speed (at 0 K) of electron gas, Specific heat anomaly of metals and its solution
26	March 5-10,2018	M.B. distribution as a limiting case of B.E. and F.D. distributions, Comparison of three statistics
27	March, 12-17,2018	Dulong and Petit law. Derivation of Dulong and Petit law from classical physics
28	March 19-24,2018	Specific heat at low temperature, Einstein theory of specific heat

29	March 26-31, 2018	Criticism of Einstein theory, Debye model of specific heat of solids, success and shortcomings of Debye theory, comparison of Einstein and Debye theories.
30	April 2-7, 2018	Fermi energy and Fermi temperature, Fermi Dirac energy distribution law for electron gas in metals
31	April 9- 13, 2018	Degeneracy and B.E. Condensation, Fermi- Dirac energy distribution law
32	April 16-21, 2018	revision of syllabus
33	April 23-28, 2018	revision of syllabus

R. Arora

DYAL SINGH COLLEGE, KARNAL

Lesson Plan

session 2017-18

Name of the Associate Professor Prof. Rajesh Arora

Class and Section: B.Sc NM A& B

Subject: Quantum and Laser Physics , Atomic and Molecular Spectroscopy

Week Days Topics

1	July 15, 17--22,2017	Overview, scale of quantum physics, boundary between classical and quantum, phenomena, Photon, Photoelectric effect, Compton effect (theory and result), Frank- Hertz experiment
2	July 24-29,2017	de-Broglie hypothesis. Davisson and Germer experiment, ·G.P. Thomson experiment. Phase velocity, group velocity and their relation. Heisenberg's uncertainty principle.
3	July 31- Aug 5, 2017	Time energy and angular momentum, position uncertainty. Uncertainty principle from de Broglie wave. (Wave-particle duality). Gamma Ray Microscope
4	Aug. 7- 12,2017	Electron diffraction from a slit. Derivation of 1-D time-dependent Schrodinger wave equation (subject to force, free particle). Time-independent Schrodinger wave equation
5	Aug. 14-19,2017	eigen values, eigen functions, wave functions and its significance. Orthogonality and Normalization of function
6	Aug. 21-26,2017	concept of observer and operator. Expectation values of dynamical quantities, probability current density
7	Aug. 28- Sep. 2,2017	Application of Schrodinger wave equation: solution of Schrodinger wave equation, eigen functions, eigen values, quantization of energy and momentum, nodes and anti nodes, zero point energy
8	Sep. 4-9, 2017	Application continued..
9	Sep.11-16,2017	Absorption and emission of radiation, Main features of a laser: Directionality, high intensity, high degree of coherence
10	Sep.18-23,2017	spatial and temporal coherence, Einstein's coefficients and possibility of amplification, momentum transfer, life time of a level

11	Sep.25-30,2017	kinetics of optical absorption ((two and three level rate equation, Fuchbauer landerburg formula).population inversion: A necessary condition for light amplification, resonance cavity
12	Oct.3-7, 2017	laser pumping, Threshold condition for laser emission, line broadening mechanism
13	Oct. 9-14, 2017	homogeneous and inhomogeneous line broadening (natural, collision and Doppler broadening)
14	Oct. 23-28,2017	He-Ne laser and RUBY laser (Principle, Construction and working)
15	Oct. 30- Nov.4,2017	Optical properties of semiconductor (Principle, Construction and working)
16	Nov. 6- 13, 2017	Applications of lasers in the field of medicine and industry.
17	Jan. 1-6,2018	Orbital magnetic dipole moment (Bohr megnaton), 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
18	Jan. 8-13,2018	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
19	Jan. 15-20, 2018	Main features of Alkali Spectra and their theoretical interpretation, term series and limits, Rydeburg-Ritze combination principle, Absorption spectra of Alkali atoms.
20	Jan. 22-27,2018	observed doublet fine structure in the spectra of alkali metals and its Interpretation, Intensity rules for doublets, comparison of Alkali spectra and Hydrogen spectrum .
21	Jan. 29 -Feb 3,2018	Essential features of spect ra of Alkaline-earth elements, Vector model for two valance electron atom: application of spectra. Coupling Schemes;LS or Russell – Saunders Coupling Scheme and JJ coupling scheme, Interaction energy in L-S coupling (sp, pd configuration), Lande interval rule.
22	Feb 5-10,2018	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

23	Feb.12-17,2018	Hyperfine structure of spectral lines and its origin; isotope effect, nuclear spin.
24	Feb. 19-24,2018	Zeeman Effect (normal and Anomalous),Experimental set-up for studying Zeeman effect, Explanation of normal Zeeman effect(classical and quantum mechanical)
25	Feb. 26-27, 2018	Explanation of anomalous Zeeman effect(Lande g-factor),
26	March 5-10,2018	Zeeman pattern of D1 and D2 lines of Na atom, Paschen-Back effect of a single valence electron system
27	March, 12-17,2018	Weak field Stark effect of Hydrogen atom
28	March 19-24,2018	Introduction of early observations, emission and absorption spectra, atomic spectra, wave number, spectrum of Hydrogen atom in Balmer series, Bohr atomic model(Bohr's postulates) , spectra of Hydrogen atom
29	March 26-31, 2018	explanation of spectral series in Hydrogen atom, un-quantized states and continuous spectra, spectral series in absorption spectra, effect of nuclear motion on line spectra (correction of finite nuclear mass)
30	April 2-7, 2018	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, Bohr's corresponding principle
31	April 9- 13,2018	Sommerfeld's extension of Bohr's model, Sommerfeld relativistic correction, Short comings of Bohr-Sommerfeld theory
32	April 16-21, 2018	model; space quantization, electron spin, coupling of orbital and spin angular momentum, spectroscopic terms and their notation, quantum numbers associated with vector atom model, transition probability and selection rules.
33	April 23-28,2018	revision of syllabus

DYAL SINGH COLLEGE, KARNAL

Lesson Plan

session 2017-18

Name of the Assistant Professor Ms. Nidhi Jast

Class and Section: B.Sc NM A& B

Subject: Physics (Wave & Optics)

Week	days	Topics
1	July 15, 17-- 22,2017	Orientation for new comers
2	July 24-29,2017	Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference
3	July 31- Aug 5, 2017	Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet
4	Aug. 7- 12,2017	Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes,
5	Aug. 14-19,2017	phase change on reflection, problems discussion, numericals
6	Aug. 21-26,2017	Interference by Division of Amplitude: Plane parallel thin film, production of colors in thin films
7	Aug. 28- Sep. 2,2017	classification of fringes in films, Interference due to transmitted light and reflected light, wedge shaped film
8	Sep. 4-9, 2017	Newton's rings, it's applications
9	Sep.11-16,2017	Interferometer: Michelson's interferometer and its applications
10	Sep.18-23,2017	Fresnel's diffraction: Fresnel's assumptions and half period zones
11	Sep.25-30,2017	rectilinear propagation of light, zone plate
12	Oct.3-7, 2017	diffraction at a straight edge, rectangular slit and circular aperture, narrow slit and wire
13	Oct. 9-14, 2017	Fraunhoffer diffraction: single-slit diffraction, double-slit diffraction, N-slit diffraction, plane transmission grating spectrum
14	Oct. 23-28,2017	dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating
15	Oct. 30- Nov.4,2017	prism and grating spectra
16	Nov. 6- 13, 2017	revision
17	Jan. 1-6,2018	Polarization: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction
18	Jan. 8-13,2018	Huygen's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light

19	Jan. 15-20, 2018	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
20	Jan. 22-27,2018	Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz)
21	Jan. 29 -Feb 3,2018	Fourier theorem and Fourier series, evaluation of Fourier coefficient, importance and limitations of Fourier theorem
22	Feb 5-10,2018	even and odd functions, Fourier series of functions $f(x)$ between (i) 0 to 2π , (ii) $-\pi$ to π , (iii) 0 to π
23	Feb.12-17,2018	(iv) $-L$ to L , complex form of Fourier series, Application of Fourier theorem for analysis of complex waves
24	Feb. 19-24,2018	half and full wave rectifier outputs
25	Feb. 26-27, 2018	Parseval identity for Fourier Series, Fourier integrals
26	March 5-10,2018	Fourier transforms and its properties
27	March, 12-17,2018	Application of Fourier transform (i) for evaluation of integrals, (ii) for solution of ordinary differential equations
28	March 19-24,2018	FT of $f(x)= e^{-x^2/2}$, problems discussion and numerical
29	March 26-31, 2018	Matrix methods in paraxial optics, effects of translation and refraction
30	April 2-7, 2018	derivation of thin lens and thick lens formulae, unit plane, nodal planes, system of thin lenses.
31	April 9- 13,2018	Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies
32	April 16-21, 2018	Optical fiber, Critical angle of propagation, Mode of Propagation, Acceptance angle, Fractional refractive index change
33	April 23-28,2018	Numerical aperture, Types of optics fiber, Normalized frequency, Pulse dispersion, Attenuation, Applications, Fiber optic Communication, Advantages

R. Arora