**Lesson Plan**

**Semester I , Paper I- PHY 101 : Mechanics**

# Teacher Name : MR Chatterpal\Dr Priyanka Dhawan

# Session: 2019-20

*Week 1*

**Lecture 1**: Unit-I : Mechanics of single and system of particles.

**Lecture 2**: Conservation of laws of linear momentum.

**Lecture 3**: Angular momentum and Mechanical energy.

*Week 2*

**Lecture 4**: ,Centre of mass and equation of motion

**Lecture 5** : Constrained motion

**Lecture 6**: Degrees of freedom

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**: Generalised coordinates, displacement, velocity

**Lecture 11** Generalised acceleration, momentum.

**Lecture 12**: Generalised force and potential.

*Week 5*

**Lecture 13:**Unit-1 (Internal Assesment- Test)

**Lecture 14:**Hamilton’s variational principle

**Lecture 15 :**Lagrange’s equation of motion from Hamilton’s Principle.

*Week 6*

**Lecture 16:**Linear Harmonic oscillator, simple pendulum,

**Lecture 17** Atwood’s machine.

**Lecture 18**. Numerical Problems from Unit-2

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:** Students problems related to Unit-2

**Lecture 21:**Rotation of Rigid body

*Week 8*

**Lecture 22:**Moment of inertia.

**Lecture 23:** Torque, angular momentum

**Lecture 24:** Kinetic energy of rotation.

*Week 9*

**Lecture 25:**. Unit-2 ( Internal Assesment- Test)

**Lecture 26:**Theorems of perpendicular and parallel axes with proof

**Lecture 27 :**Moment of inertia of solid sphere

*Week 10*

**Lecture 28:** Moment of inertia of Hollow sphere and Spherical shell.

**Lecture 29:** Moment of inertia ofsolid cylinder, hollow cylinder

**Lecture 30:** Moment of Inertia solid bar of rectangular cross-section.

*Week 11*

**Lecture 31:**Acceleration of a body rolling down on an inclined plane.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Classical Mechanics by V.K.Jain (Ane 2009)
2. Classical Mechanics by H. Goldstein (2nd Edition)
3. Berkeley Physics Course, Vol. I, Mechanics by E.M. Purchell

**Lesson Plan**

# PaperII-PHY102:ELECTRICITYANDMAGNETISM

# Teacher Name : Mrs Innu Yadav/Dr Priyanka Dhawan

# Session: 2019-20

*Week 1*

**Lecture 1**: Unit-I : **Mathematical Background :** Scalars and Vectors, dot and cross product,

**Lecture 2:**Triple vectorproduct, Scalar and Vector fields,

**Lecture 3:** Differentiation of a vector, Gradient of a scalar and itsphysical significance,

*Week 2*

**Lecture 4:**Integration of a vector (line, surface and volume integral and theirphysicalsignificance),

**Lecture 5:**Gauss’s divergencetheorem

**Lecture 6:**andStockstheorem.

*Week 3*

**Lecture 7:Electrostatic Field :** Derivation of field E from potential as gradient,

**Lecture 8:**derivation ofLaplace and Poisson equations. Electric flux,

**Lecture 9:** Gauss’s Law and its application tospherical shell,

*Week 4*

**Lecture 10:** uniformly charged infinite plane and uniformity charged straight wire,mechanicalforceof chargedsurface,

**Lecture 11:**Energyperunitvolume.

**Lecture 12: Test**

*Week 4*

**Lecture 12:** Unit II: **Magnetostatistics :** Magnetic Induction, magetic flux,

**Lecture 13:** Unit solenoidal nature of Vector fieldof induction.

**Lecture 14:** PropertiesofB

*Week 5*

**Lecture 15:** Electronic theory of dia andpara magnetism (Langevin’s theory).

**Lecture 16:**Domain theory of ferromagnetism.

*Week 6*

**Lecture 17:** Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 18:** Contt.. Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 19 :** Discussion on previous years question from unit II

*Week 7*

**Lecture 20:** Test

**Lecture 21:**UnitIII**Electromagnetic Theory : Introduction**

**Lecture 22:** Maxwell equation and their derivations,

*Week 8*

**Lecture 23:** Contt.. Maxwell equation and their derivations,

**Lecture 24:Contt..** Maxwell equation and their derivations,

**Lecture 25:Test**

*Week 9*

**Lecture 26:** DisplacementCurrent.

**Lecture 27:** Vectorandscalarpotentials,

**Lecture 28 :** Contt. Vectorandscalarpotentials,

*Week 10*

**Lecture 29:**boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 30 :** contt boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 31:** Contt. boundaryconditionsatinterfacebetweentwodifferentmedia,

*Week 11*

**Lecture 32: Contt** boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 33:** Propagationofelectromagneticwave(Basicidea,noderivation).

*Week 12*

**Lecture 34 :**PoyntingvectorandPoyntingtheorem.

**Lecture 35:** Revision

**Lecture 36:** Test

# References:

1. ElectricityandMagnetism byReitzandMilford(PrenticeHallofIndia)
2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill).

**Lesson Plan**

**SemesterIII , PaperI-PHY301:ComputerProgramming,Thermodynamics**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan/Dr AD Mittal

# Session: 2019-20

Week 1

**Lecture 1**: Unit-I : ComputerProgramming:Computerorganization,Binaryrepresentation

**Lecture 2**: Algorithm development,

**Lecture 3**: flowchartsand theirinterpretation.

Week 2

**Lecture 4**: Flowchart and algorithm-based problems

**Lecture 5** :Fortran Preliminaries: Integer and floating point arithmetic expression, **Lecture 6**: built infunctions executable and non-executable statements,input and outputstatements,

Week 3

**Lecture 7**: Formats,

**Lecture 8**: I.F.and GO TO statements,

**Lecture 9**: Do statement

Week 4

**Lecture 10**: Dimension, arrays statement

**Lecture 11**: Function andfunctionsubprogram.

**Lecture 12**: Test

Week 5

**Lecture 13:**Unit-II Thermodynamics-I:Secondlawofthermodynamics,

**Lecture 14:**Carnottheorem,Absolute scale of temperature,

**Lecture 15 :** test

Week 6

**Lecture 16:** Absolute Zero,

**Lecture 17:** Entropy, show that dQ/T=O, T-S diagramNernst heat law,

**Lecture 18:** Joule’s free expansion, Joule Thomson (Porous plug)experiment. Joule - Thomson effect.

Week 7

**Lecture 19:**  Liquefication of gases.

**Lecture 20:** Liquification of gases Contt.

**Lecture 21:** Test

Week 8

**Lecture 22:** Air pollution due to internalcombustionEngine.

**Lecture 23 :Unit III-**Thermodynamics-II : Derivation of Clausius – Claperyron Equation latent heat equation

**Lecture 24 :test**

Week 9

**Lecture 25:**. Phase diagram

**Lecture 26:** triple point of a substance.

**Lecture 27 :** test

Week 10

**Lecture 28:** Development of Maxwellthermodynamicalrelations.

**Lecture 29: contt.**Development of Maxwellthermodynamicalrelations.

**Lecture 30:**ApplicationofMaxwellrelationsinthederivationof relationsbetweenentropy,specificheatsandthermodynamicvariables.

Week 11

**Lecture 31:** Test

**Lecture 32:** Thermodynamic functions : Internal energy (U), Helmholtz function (F),

**Lecture 33** Enthalpy(H),Gibbsfunction(G)andthe relations betweenthem.

Week 12

**Lecture 34: Test**

**Lecture 35: Revision lecture**

**Lecture 36: Test**

# References:

1. Rajaraman,FortranProgramming.
2. SchaumSeries,Fortran77.
3. RamKumar,ProgrammingwithFortran-77.
4. S.LokanathanandR.S.,Gambir,StatisticalandThermalPhysics(AnIntroduction),PrenticeHallofIndia,Pvt.,Ltd.(1991,NewDelhi).
5. J.K.SharmaandK.K.Sarkar,ThermodynamicsandstatisticalPhysics,Himalaya PublishingHouse(1991,Bombay.)
6. M.W.ZemanskyandR.Dittman,HeatandThermodynamics,McGrawHill,NewYork (1981).

# Lesson plan Paper-IIPHY302

**Optics–I**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan/Dr AD Mittal

# Session: 2019-20

Week 1

**Lecture 1:** Unit-I: Fourier Analysis and Fourier Transforms : Speed of transverse waves on auniform string.

**Lecture 2:** Speed of longitudinal waves in a fluid

**Lecture 3:** superposition of waves(physical idea)

Week 2

**Lecture 4:**  Fourier Analysis of complex waves

**Lecture 5:** Fourier Analysis application for thesolution of triangular

**Lecture 6:** : Fourier Analysis rectangular waves,

Week 3

**Lecture 7: Application of Fourier analysis to** half wave rectifier output

**Lecture 8** : **Application of Fourier analysis to** full wave rectifier out puts.

**Lecture 9**: Test

Week 4

**Lecture 10:**Fouriertransformsanditsproperties.

**Lecture 11:** Applicationoffouriertransformtofollowing function.

(I)

f(x) =

e-x2/2

**Lecture 12:** Applicationoffouriertransformtofollowing function.

f(x) = I[x]<a

0[x]>a

Week 5

**Lecture 13: Unit II Geometrical optics : Introduction to** GeometricalOptics:

**Lecture 14:** Matrixmethodsinparaxialoptics,

**Lecture 15:** effectsoftranslationand refraction,

Week 6

**Lecture 16:** Test

**Lecture 17 :**derivation of thin lens and thick lens formulae using matrix method,

**Lecture 18:** unit plane, nodalplanes, system of thin lenses,

Week 7

**Lecture 19:** Chromatic,

**Lecture 20:** spherical

**Lecture 21:** coma,

Week 8

**Lecture 22:** astigmatism and

**Lecture 23:**distortionaberrationsand theirremedies.

**Lecture 24:** Test

Week 9

**Lecture 25:** Unit Interference : Introduction to Interference

**Lecture 26:** Interference by Division of Wavefront : Young’s Double slit Experiment

**Lecture 27:** Fringe width in Young’s Double slit experiment

Week 10

**Lecture 28:** Interference of white light vs monochromatic light and law of conservation of energy in interference

**Lecture 29 :** Fresnel’s Biprism

**Lecture 30:** Applications of Fresnel’s Biprism in determinationofwavelengthofsodiumlight

Week 11

**Lecture 31:**Application of Frenel’s Bi-prism in determination of thicknessofmica sheet,

**Lecture 32:**Lioyd’smirror,

**Lecture 33:** phase change on reflection.

Week 12

**Lecture 34:** Difference Between interference by Liyod mirror and Frsenel’s Bi-prism

**Lecture 35:** Revision

**Lecture 36:** Test

# References

1. MathematicalPhysicsbyB.S.RajputandYogPrakashPragatiPrakashan.
2. TheoryandProblemsofLaplaceTransformsbyMurrariR.spiegel,McGrawHillBook Company.
3. OpticsbyAjayGhatak,TataMcGrawHill1977.
4. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: QUANTUM MECHANICS SUBJECT CODE: PHY 502 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2019-2020**

**FACULTY: Dr Parminder/Dr Monika Malik**

**WEEK 1**

**LECTURE 1: UNIT-1:** Failure of (Classical) E.M. Theory, quantum theory of radiation (old quantum theory)

**LECTURE 2:** Photon, photoelectric effect and Einstein’s photoelectric equation

**LECTURE 3:** Compton Effect (theory and result)

**WEEK 2**

**LECTURE 4:** Inadequancy of old quantum theory, de-Broglie hypothesis

**LECTURE 5:** Davisson and Germer experiment, G.P. Thomson experiment

**LECTURE 6:** Phase velocity group velocity

**WEEK 3**

**LECTURE 7:** Heisenberg's uncertainty principle

**LECTURE 8:** Time-energy and angular momentum

**LECTURE 9:** position uncertainty, Uncertainty principle

**WEEK 4**

**LECTURE 10:** de-Broglie wave, (wave-particle duality).Gamma Ray Microscope

**LECTURE 11:** Electron diffraction from a slit

**LECTURE 12: TEST**

**WEEK 5**

**LECTURE13:** Derivation of time dependent Schrodinger wave equation

**LECTURE 14:** Derivation of time- independent Schrodinger wave equation

**LECTURE 15:** Discussion of Schrodinger wave equation

**WEEK 6**

**LECTURE 16:** Eigen values, Eigen functions, wave functions and its significance.

**LECTURE 17:** Normalization of wave function

**LECTURE 18:** concept of observable and operator

**WEEK 7**

**LECTURE 19:** Solution of Schrodinger equation

**LECTURE 20:** equation for harmonic oscillator excited states

**LECTURE 21:** equation for harmonic oscillator ground states

**WEEK 8**

**LECTURE 22:** Application of Schrodinger equation in the solution of the following one-dimensional problems

**LECTURE 23:** Schrodinger equation in the solution of the following 2-dimensional problems

**LECTURE 24:** Discussion ofSchrodinger equation in the solution of the following 2-dimensional problems

**WEEK 9**

**LECTURE 25:** Free particle in one dimensional box

**LECTURE 26:** Free particle in two dimensional box

**LECTURE 27:** Free particle in three dimensional box

**WEEK 10**

**LECTURE 28:** Problem class

**LECTURE 29:** solution of Schrödinger wave equation, Eigen function, Eigen values

**LECTURE 30:** solution of Schrödinger wave equation quantization of energy and momentum

**WEEK 11**

**LECTURE 31:** solution of Schrödinger wave equation nodes and antinodes, zero point energy

**LECTURE 32:** One-dimensional potential barrier E>V0 (Reflection and Transmission coefficient.

**LECTURE 33:** One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakagecoefficient,penetration depth).

**WEEK 12**

**LECTURE 34:** Revision

**LECTURE 35:** Test

**LECTURE 36:** Test

## References:

1. Quantum Mechanics by L.I.Schiff, McGraw Hill Book Company, Inc.
2. Quantum Mechanics by B. Crasem and J. D.Powel (Addison Wesley.
3. QuantumMechanics byA.P. Messiah

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: SOLID STATE PHYSICS SUBJECT CODE: PHY 501 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2019-2020 SECTION: - A**

**FACULTY: Mr Vivek/Dr Monika Malik**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Crystalline and glassy forms, liquid crystals
* **LECTURE 2:**Crystal structure, periodicity, lattice, and basis
* **LECTURE 3:**Crystal translational vectors

**WEEK 2**

* **LECTURE 4:**Crystal translational axes
* **LECTURE 5:**Unit cell and primitive cell
* **LECTURE 6:**Winger Seitz primitive Cell

**WEEK 3**

* **LECTURE 7:**Symmetry operations for a two-dimensional crystal
* **LECTURE 8:**Bravais lattices in two dimensions
* **LECTURE 9:**Bravais lattices in three dimensions

**WEEK 4**

* **LECTURE 10:TEST**
* **LECTURE 11:**Crystal planes
* **LECTURE 12:** Detail Information of Miller indices

**WEEK 5**

* **LECTURE 13:** Formation of Interplanar spacing
* **LECTURE 14:** Crystal structures of Zinc sulphide
* **LECTURE 15:** Crystal structures of Sodium Chloride

**WEEK 6**

* **LECTURE 16: :** Crystal structures of Diamonds.
* **LECTURE 17:** X-ray diffraction
* **LECTURE 18:** Bragg's Law

**WEEK 7**

* **LECTURE 19:** Experimental x-ray diffraction methods
* **LECTURE 20**: K-space
* **LECTURE 21: TEST**

**WEEK 8**

* **LECTURE 22:** Reciprocal lattice and its physical significance
* **LECTURE 23:** Reciprocal lattice vectors
* **LECTURE 24:** Reciprocal lattice to a simple cubic lattice

**WEEK 9**

* **LECTURE 25:** Reciprocal lattice to B C C
* **LECTURE 26:** Reciprocal lattice to F C C
* **LECTURE 27:** Relation between three lattices

**WEEK 10**

* **LECTURE 28:** Introduction to specific heat of solids
* **LECTURE 29:** Dulong and Pettit’s law of specific heat of solids and its drawbacks
* **LECTURE 30:** Einstein's theory of specific heat

**WEEK 11**

* **LECTURE 31:** Drawbacks of Einstein theory of specific heat
* **LECTURE 32:** Debye model of specific heat of solids.
* **LECTURE 33:** Comparison of three theories of specific heats of solids.

**WEEK 12**

* **LECTURE 34: Test**
* **LECTURE 35: Revision**
* **LECTURE 36: Test**

## References:

1. Introduction to solid state Physics (5th Ed.) by kittel, Wiley eastern Limited.

**Lesson Plan**

**Semester II ,**

**Paper I- PHY 201 :** Properties of Matter, Kinetic theory and Relativity

# Teacher Name : Mrs Innu Yadav/Dr Priyanka Dhawan

# Session: 2019-20

*Week 1*

**Lecture 1**: Unit-I : **:** Elasticity, Hooke’s law

**Lecture 2**: Elastic constants and their relations

**Lecture 3**: Poisson’s ratio, torsion of cylinder and twisting couple

*Week 2*

**Lecture 4**: ,Topic continued from Lecture 3

**Lecture 5** : Bending of beam (bending moment and its magnitude) cantilevers

**Lecture 6**: Centrally loaded beam.

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**:**: Unit-2 :** Assumptions of Kinetic Theory of gases, Law of equipartition of energy and its applications for specific heats of gases.

**Lecture 11** Topic continued.

**Lecture 12**: Maxwell distribution of speeds and velocities (derivation required).

*Week 5*

**Lecture 13:**Unit-1 (Internal Assessment- Test)

**Lecture 14:**Experimental verification of Maxwell’s Law of speed distribution

**Lecture 15 :**Most probable speed, Average and r.m.s. speed

*Week 6*

**Lecture 16:**Mean free path. Transport of energy and momentum,

**Lecture 17** Diffusion of gases. Brownian motion (qualitative)

**Lecture 18**. Real gases, Van der Waal’s equation.

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:**Student’s problems related to Unit-2

**Lecture 21:**Reference systems, inertial frames.

*Week 8*

**Lecture 22:Unit 3:** Galilean invariance and Conservation laws

**Lecture 23:** Newtonian relativity principle

**Lecture 24:** Michelson - Morley experiment: Search for ether.

*Week 9*

**Lecture 25:**. Unit-2 (InternalAssessment- Test)

**Lecture 26:**Topic continued from Lecture 24

**Lecture 27 :**Lorentz transformations

*Week 10*

**Lecture 28:** Length contraction.

**Lecture 29:** Time dilation.

**Lecture 30:** Velocity addition theorem, variation of mass with velocity and mass energy equivalence.

*Week 11*

**Lecture 31:**Topic continued.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (Vth Edition) by Mark W. Zemansky.
3. Berkeley Physics Course, Vol.-I Mechanics by E.M. Purchell.

**Lesson Plan**

# SemesterII, PaperII-PHY-202:ELECTROMAGNETIC

# INDUCTIONANDELECTRONICDEVICES

# Teacher Name: Dr Kartar singh/Dr Priyanka Dhawan

# Session: 2019-20

Week 1

**Lecture 1:**Growthanddecayofcurrentinacircuit with(a)Capacitanceand resistance (b)

resistance and inductance

**Lecture 2**: (c) Capacitance and inductance (d) Capacitanceresistanceandinductance.

**Lecture 3**: AC circuit analysis using complex variables with (a) capacitance and resistance,

Week 2

**Lecture 4**: (b) resistanceandinductance(c)capacitanceandinductance(d)capacitance,

inductance

**Lecture 5** : andresistanceSeriesandparallelresonantcircuit.

**Lecture 6**: Qualityfactor (Sharpnessof resonance).

Week 3

**Lecture 7**: Energybandsinsolids.

**Lecture 8**: Intrinsicandextrinsicsemiconductor,Halleffect,

**Lecture 9**: P-Njunctiondiode andtheirV-Icharacteristics.

Week 4

**Lecture 10**: Zenerandavalanchebreakdown. Resistance of a diode,

**Lecture 11**: Light Emitting diodes (LED). Photo conduction in semiconductors,photodiode,Solar Cell

**Lecture 12**: P-Njunctionhalfwaveandfullwaverectifier.

Week 5

**Lecture 13:** Typesoffiltercircuits(Land-withtheory).

**Lecture 14:**Zenerdiodeasvoltageregulator,simpleregulatedpowersupply.

**Lecture 15 :Transistors :** Junction Transistors, Bipolar transistors,

Week 6

**Lecture 16:** working of NPN and PNP transistors,

**Lecture 17:**Transistor connections(C-B, C-E, C-C mode

**Lecture 18:**), constants of transistor. Transistor characteristic curves (excluding h parameter analysis),

Week 7

**Lecture 19:** advantageof C-Bconfiguration.C.R. O.(Principle, constructionandworkingin detail).

**Lecture 20: Test**

**Lecture 21:** Transistor Amplifiers : Transistor biasing

Week 8

**Lecture 22:**, methods of Transistor biasing and stabilization. D.C.load line

**Lecture 23 :** . Common-base and common-emitter transistor biasing.

**Lecture 24 :** Common-base, common-emitteramplifiers.

Week 9

**Lecture 25:**. Classification of amplifiers.

**Lecture 26:**Resistance-capacitance (R-C) coupled amplifiertwostage

**Lecture 27 :**;conceptofbandwidth,noderivation).

Week 10

**Lecture 28:**. Feed-backinamplifiers,

.**Lecture 29:** advantageofnegativefeedbackEmitterfollower.

**Lecture 30:**Oscillators:Oscillators,PrincipleofOscillation,

Week 11

**Lecture 31:**ClassificationofOscillator.

**Lecture 32:** Conditionforself-sustained oscillation

**Lecture 33:**: Barkhousen Criterion for oscillations.

Week 12

**Lecture 34:** Tuned collector common emitteroscillator.Hartleyoscillator. Colpitt’s

oscillator

**Lecture 35: Doubt class & Numerical problems discussion**

**Lecture 36: Test**

# References:

1. ElectricityandMagnetismbyReitzandMilford(PrenticeHallofIndia)
2. ElectricityandMagnetismbyA.S.MahajanandA.A.Rangwala(TataMcGrawHill).
3. BasicElectronicsandLinearcircuitsbyN.N.Bhargava,D.C.KulshreshthaandS.C.Gupta(TITI, CHD).
4. SoildStateElectronicsbyJ.P.Agarwal,AmitAgarwal(PragatiPrakashan,Meerut).
5. ElectronicFundamentalsandApplicationsbyJ.D.Ryder(PrenticeHallIndia)

**LESSON PLAN**

**Semester IV, PAPER PH 401 : STATISTICAL MECHANICS**

**Teacher’s Name :Dr Anu Chauhan/Mrs Pooja**

**Session: 2019-20**

**WEEK 1**

**Lecture 1** : Unit-IIntroduction: Probability,someprobabilityconsiderations

**Lecture 2** : Combinationspossessingmaximum probability, combinations possessing

minimum probability

**Lecture 3** : Distribution ofmoleculesintwoboxes.

**WEEK 2**

**Lecture 4 :** Casewith weightage (general).

**Lecture 5** : Phase space,microstates and macrostates

**Lecture 6** : statistical fluctuations

**WEEK 3**

**Lecture 7 :** constraints and accessibleStates

**Lecture 8** : Thermodynamicalprobability

**Lecture 9** : Numerical of unit-II will be discussed

**WEEK 4**

**Lecture 10 :** Revision of unit-I

**Lecture 11** : Test of unit-I

**Lecture 12**: Postulates of Statistical Physics, Division of Phase space into cells

**WEEK 5**

**Lecture 13 :** Condition ofequilibrium between two system in thermal contact. b-Parameter

**Lecture 14** : Entropy andProbability

**Lecture 15** : Boltzmann’s distribution law. Evaluation of A and b

**WEEK 6**

**Lecture 16 :**  Bose-Einsteinstatistics

**Lecture 17** : ApplicationofB.E.StatisticstoPlanck’sradiationlaw

**Lecture 18** : B.E.gas.

**WEEK 7**

**Lecture 19 :** Numerical of unit 2

**Lecture 20** : Test of unit 2

**Lecture 21** : Fermi-Dirac statistics

**WEEK 8**

**Lecture 22 :** M.B. Law as limiting case of B.E. statistics

**Lecture 23** : Degeneracy

**Lecture 24** : B.E.Condensation

**WEEK 9**

**Lecture 25 :** Fermi- DiracGas

**Lecture 26** : Electrongasinmetals

**Lecture 27** : Zeropointenergy

**WEEK 10**

**Lecture 28 :** Specificheatofmetalsandits solution

**Lecture 29** : Numerical of unit 3

**Lecture 30** : Revision of unit-3

**WEEK 11**

**Lecture 31 :** Revision of unit-I

**Lecture 32** : Revision of unit-II

**Lecture 33** : Revision of unit-III

**WEEK 12**

**Lecture 34:** Quiz of unit I

**Lecture 35:** Quiz of unit II

**Lecture 36:** Quiz of unit III

**References:**

1. B.B.Laud,“IntroductiontoStatisticalMechanics”(Macmillan1981).
2. F.Reif,“StatisticalPhysics’(McGrawHill1988).
3. K.Huang,“StatisticalPhysics”(WileyEaster 1988).

**Lesson Plan**

**SemesterIV , PaperII-PHY 402: Optics-2**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan

# Session: 2019-20

Week 1

**Lecture 1**: Unit-I : Introduction

**Lecture 2**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film

**Lecture 3**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film(contd.)

Week 2

**Lecture 4**: Newton’srings

**Lecture 5** : Interferometers:Michelson’sinterferometerand

**Lecture 6**: itsapplicationto

(I) Standardization of a meter (II) determination of wave length

Week 3

**Lecture 7**:itsapplicationto

(I) Standardization of a meter (II) determination of wave length(contd.)

**Lecture 8**: Fresnel’sDiffraction (introduction)

**Lecture 9**: Fresnel’shalfperiodzones

Week 4

**Lecture 10**: zoneplate,diffractionatastraightedge

**Lecture 11**: rectangularslit and circular aperture.

**Lecture 12**: Unit test

Week 5

**Lecture 13:** Unit-2, Fraunhofer diffraction(introduction)

**Lecture 14:** One slit diffraction

**Lecture 15 :** Two slit diffraction

Week 6

**Lecture 16:** N-slit diffraction,

**Lecture 17:** Plane transmission granting spectrum

**Lecture 18:** Dispersive power of a grating

Week 7

**Lecture 19:**  Limit ofresolution

**Lecture 20:** Rayleigh’scriterion

**Lecture 21:** resolvingpoweroftelescopeandagrating

Week 8

**Lecture 22:**Revision and Doubt class

**Lecture 23:**Revision and Doubt class

**Lecture 24 :**test

Week 9

**Lecture 25:** Introduction to wave nature of light

**Lecture 26:** Polarisation and Double Refraction

**Lecture 27:** Polarisation by reflection

Week 10

**Lecture 28:** Polarisation by scattering

**Lecture 29:** Malus law, Phenomenon of double refraction

**Lecture 30:**Huygen’s wave theory of double refraction (Normal and oblique incidence)

Week 11

**Lecture 31:** Analysis of Palorised light : Nicol prism

**Lecture 32:** Quarter wave plate and half wave plate

**Lecture 33:** production and detection of (i) Plane polarized light (ii) Circularly polarized lightand (iii)Elliptically polarized light,

Week 12

**Lecture 34:** Optical activity, Fresnel’s theory of rotation

**Lecture 35:** Specificrotation,Polarimeters(halfshade and Bi-quartz).

**Lecture 36:** Test

# References:

1. OpticsbyAjayGhatak,TataMcGrawHill1977.
2. IntroductionofOpticsbyFrankL.PedrottiandLenoS.Pedrotti,PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: ATOMICMOLECULARANDLASERPHYSICS SUBJECT CODE: PHY 601 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2019-2020 SECTION: - A**

**FACULTY: Mr Vivek**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Vector atom model
* **LECTURE 2:**Quantum numbers associated with vector atom model
* **LECTURE 3:**Penetrating orbits (qualitiative description)

**WEEK 2**

* **LECTURE 4:**Non- penetrating orbits (qualitiative description)
* **LECTURE 5:**Spectral lines in different series of ailkali spectra
* **LECTURE 6:**Continue (Spectral lines in different series of ailkali spectra)

**WEEK 3**

* **LECTURE 7:**Spin orbit interactionand doublet term separation
* **LECTURE 8:**LS or Russel-Saunder Coupling (expressions for interaction energies)
* **LECTURE 9::**JJ Coupling (expressions for interaction energies)

**WEEK 4**

* **LECTURE 10:Test**
* **LECTURE 11:**Zeeman effect (normal and Anormalous)
* **LECTURE 12:** Zeeman pattern of D 1 and D2 lines of Na-atom

**WEEK 5**

* **LECTURE 13:** Paschen, Back effect of a single valence electron system
* **LECTURE 14:** Weak field Strak effect of Hydrogen atom
* **LECTURE 15:** Diseete set of electronic energies of molecules

**WEEK 6**

* **LECTURE 16:** Quantisation of Vibrational energies
* **LECTURE 17:** Quantisation of ratiationalenergies
* **LECTURE 18:** Raman effect (Quantitative description)

**WEEK 7**

* **LECTURE 19:** Stoke's lines
* **LECTURE 20**: Anti Stoke's lines
* **LECTURE 21: Test**

**WEEK 8**

* **LECTURE 22:** Main features of a laser : Directionality, high intensity
* **LECTURE 23:** High degree of coherence
* **LECTURE 24:** Spatial and temporal coherence

**WEEK 9**

* **LECTURE 25:** Einstein's coefficients
* **LECTURE 26:** Possibility of amplification
* **LECTURE 27:** Momentum transfer, life time of a level

**WEEK 10**

* **LECTURE 28:** Kinetics of optical obsorption
* **LECTURE 29:** Threshold condition for laser emission
* **LECTURE 30:** Laser pumping

**WEEK 11**

* **LECTURE 31:** He-Ne laser (Principle, Construction and Working).
* **LECTURE 32:** RUBY laser (Principle, Construction and Working).
* **LECTURE 33:** Applications of laser in the field of medicine and industry.

**WEEK 12**

* **LECTURE 34: Revision**
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Introduction to Atomic and Molecular Spectroscopy by V.K.Jain, Narosa (2007)
2. Introduction to Atomic Spectra by H.B. White.
3. Atomic spectra by G. Herzberg.
4. Molecular Spectra and Molecular Structure by G. Herzberg.
5. Fundamentals of molecular spectroscopy by Colin N. Banwell and Elaine M.Mc-Cash.
6. Lassers, Theory and Application (2nd Ed.) by Thagrajan and Ajay Ghatak.
7. Laser and Nonlinear Optics by B.B. Laud (2nd Ed.)
8. Introduction to Optics by Frank L. Pedrotti and Lens S. Pedrotti, Prentice Hall, 1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: NUCLEAR PHYSICS SUBJECT CODE: PHY 602 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2019-2020**

**FACULTY: Dr Parminder**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Nuclear mass and binding energy
* **LECTURE 2:**Systematics nuclear binding energy
* **LECTURE 3:**Nuclear stability

**WEEK 2**

* **LECTURE 4:**Detail discussion of Nuclear size
* **LECTURE 5:**Nuclear spin, parity
* **LECTURE 6:**Statistics magnetic dipole moment, quadrupole moment (shape concept)

**WEEK 3**

* **LECTURE 7:**Determination of mass by Bain-Bridge
* **LECTURE 8:**Bain-Bride and Jordan mass spectrograph
* **LECTURE 9:**Determination of charge by Mosley law

**WEEK 4**

* **LECTURE 10:**Determination of size of nuclei by Rutherford Back Scattering
* **LECTURE 11:Test**
* **LECTURE 12:** Interaction of heavy charged particles (Alpha particles)

**WEEK 5**

* **LECTURE 13:** Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula)
* **LECTURE 14:** Energetics of alpha-decay, Range and straggling of alphaparticles
* **LECTURE 15:** Geiger-Nuttal law

**WEEK 6**

* **LECTURE 16:** Introduction of Beta-particle, Origin of continuous beta-spectrum (neutrino hypothesis).
* **LECTURE 17:** Types of beta decay and energetics of beta decay
* **LECTURE 18:** Energy loss of beta- particles (ionization), Range of electrons, absorption of beta-particles

**WEEK 7**

* **LECTURE 19:** Interaction of Gamma Ray, Nature of gamma rays
* **LECTURE 20**: Energetics of gamma rays, passage of Gamma radiations through matter by photoelectric effect.
* **LECTURE 21:** Energetics of gamma rays, passage of Gamma radiations through matter by compton effect

**WEEK 8**

* **LECTURE 22:** Energetics of gamma rays, passage of Gamma radiations through matter by pair production effect
* **LECTURE 23:** Asborption of Gamma rays (Mass attenuation coefficient) and its application
* **LECTURE 24:** Nuclear reactions, Elastic scattering

**WEEK 9**

* **LECTURE 25:** Inelastic scatting, Nuclear disintegration
* **LECTURE 26:** Photoneuclear reaction, Radiative capture
* **LECTURE 27:** Direct reaction, heavy ion reactions and spallation Reactions

**WEEK 10**

* **LECTURE 28:** Conservation laws. Q-value and reaction threshold
* **LECTURE 29:** Nuclear Reactors General aspects of Reactor design
* **LECTURE 30:** Nuclear fission and fusion reactors (Principles, construction, working and use)

**WEEK 11**

* **LECTURE 31:** Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators
* **LECTURE 32:** Ionization chamber, proportional counter.
* **LECTURE 33:** G.M. counter detailed study.

**WEEK 12**

* **LECTURE 34:** Scintillation counter and semiconductor detector.
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Atomic and nuclear Physics, Vol. II by S.N. Ghashal.
2. Nuclear Physics by D.C. Tayal, Umesh Prakashan, 125, Goblind Dev Khurja (UP).
3. Concept of Modern physics by arther Besier, Tata McGraw Hill Publications.
4. Nuclear Physics by W.E. Burcham.
5. Nuclear Radiation Detectors by S.S. Kapoor
6. Experimental Nuclear Physics by M. Singru.

**Lesson Plan**

**Semester I , Paper I- PHY 101 : Mechanics**

# Teacher Name : MR Chatterpal\Dr Priyanka Dhawan

# Session: 2020-21

*Week 1*

**Lecture 1**: Unit-I : Mechanics of single and system of particles.

**Lecture 2**: Conservation of laws of linear momentum.

**Lecture 3**: Angular momentum and Mechanical energy.

*Week 2*

**Lecture 4**: ,Centre of mass and equation of motion

**Lecture 5** : Constrained motion

**Lecture 6**: Degrees of freedom

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**: Generalised coordinates, displacement, velocity

**Lecture 11** Generalised acceleration, momentum.

**Lecture 12**: Generalised force and potential.

*Week 5*

**Lecture 13:**Unit-1 (Internal Assesment- Test)

**Lecture 14:**Hamilton’s variational principle

**Lecture 15 :**Lagrange’s equation of motion from Hamilton’s Principle.

*Week 6*

**Lecture 16:**Linear Harmonic oscillator, simple pendulum,

**Lecture 17** Atwood’s machine.

**Lecture 18**. Numerical Problems from Unit-2

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:** Students problems related to Unit-2

**Lecture 21:**Rotation of Rigid body

*Week 8*

**Lecture 22:**Moment of inertia.

**Lecture 23:** Torque, angular momentum

**Lecture 24:** Kinetic energy of rotation.

*Week 9*

**Lecture 25:**. Unit-2 ( Internal Assesment- Test)

**Lecture 26:**Theorems of perpendicular and parallel axes with proof

**Lecture 27 :**Moment of inertia of solid sphere

*Week 10*

**Lecture 28:** Moment of inertia of Hollow sphere and Spherical shell.

**Lecture 29:** Moment of inertia ofsolid cylinder, hollow cylinder

**Lecture 30:** Moment of Inertia solid bar of rectangular cross-section.

*Week 11*

**Lecture 31:**Acceleration of a body rolling down on an inclined plane.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Classical Mechanics by V.K.Jain (Ane 2009)
2. Classical Mechanics by H. Goldstein (2nd Edition)
3. Berkeley Physics Course, Vol. I, Mechanics by E.M. Purchell

**Lesson Plan**

# PaperII-PHY102:ELECTRICITYANDMAGNETISM

# Teacher Name : Mrs Innu Yadav/Dr Priyanka Dhawan

# Session: 2020-21

*Week 1*

**Lecture 1**: Unit-I : **Mathematical Background :** Scalars and Vectors, dot and cross product,

**Lecture 2:**Triple vectorproduct, Scalar and Vector fields,

**Lecture 3:** Differentiation of a vector, Gradient of a scalar and itsphysical significance,

*Week 2*

**Lecture 4:**Integration of a vector (line, surface and volume integral and theirphysicalsignificance),

**Lecture 5:**Gauss’s divergencetheorem

**Lecture 6:**andStockstheorem.

*Week 3*

**Lecture 7:Electrostatic Field :** Derivation of field E from potential as gradient,

**Lecture 8:**derivation ofLaplace and Poisson equations. Electric flux,

**Lecture 9:** Gauss’s Law and its application tospherical shell,

*Week 4*

**Lecture 10:** uniformly charged infinite plane and uniformity charged straight wire,mechanicalforceof chargedsurface,

**Lecture 11:**Energyperunitvolume.

**Lecture 12: Test**

*Week 4*

**Lecture 12:** Unit II: **Magnetostatistics :** Magnetic Induction, magetic flux,

**Lecture 13:** Unit solenoidal nature of Vector fieldof induction.

**Lecture 14:** PropertiesofB

*Week 5*

**Lecture 15:** Electronic theory of dia andpara magnetism (Langevin’s theory).

**Lecture 16:**Domain theory of ferromagnetism.

*Week 6*

**Lecture 17:** Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 18:** Contt.. Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 19 :** Discussion on previous years question from unit II

*Week 7*

**Lecture 20:** Test

**Lecture 21:**UnitIII**Electromagnetic Theory : Introduction**

**Lecture 22:** Maxwell equation and their derivations,

*Week 8*

**Lecture 23:** Contt.. Maxwell equation and their derivations,

**Lecture 24:Contt..** Maxwell equation and their derivations,

**Lecture 25:Test**

*Week 9*

**Lecture 26:** DisplacementCurrent.

**Lecture 27:** Vectorandscalarpotentials,

**Lecture 28 :** Contt. Vectorandscalarpotentials,

*Week 10*

**Lecture 29:**boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 30 :** contt boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 31:** Contt. boundaryconditionsatinterfacebetweentwodifferentmedia,

*Week 11*

**Lecture 32: Contt** boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 33:** Propagationofelectromagneticwave(Basicidea,noderivation).

*Week 12*

**Lecture 34 :**PoyntingvectorandPoyntingtheorem.

**Lecture 35:** Revision

**Lecture 36:** Test

# References:

1. ElectricityandMagnetism byReitzandMilford(PrenticeHallofIndia)
2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill).

**Lesson Plan**

**SemesterIII , PaperI-PHY301:ComputerProgramming,Thermodynamics**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan

# Session: 2020-21

Week 1

**Lecture 1**: Unit-I : ComputerProgramming:Computerorganization,Binaryrepresentation

**Lecture 2**: Algorithm development,

**Lecture 3**: flowchartsand theirinterpretation.

Week 2

**Lecture 4**: Flowchart and algorithm-based problems

**Lecture 5** :Fortran Preliminaries: Integer and floating point arithmetic expression, **Lecture 6**: built infunctions executable and non-executable statements,input and outputstatements,

Week 3

**Lecture 7**: Formats,

**Lecture 8**: I.F.and GO TO statements,

**Lecture 9**: Do statement

Week 4

**Lecture 10**: Dimension, arrays statement

**Lecture 11**: Function andfunctionsubprogram.

**Lecture 12**: Test

Week 5

**Lecture 13:**Unit-II Thermodynamics-I:Secondlawofthermodynamics,

**Lecture 14:**Carnottheorem,Absolute scale of temperature,

**Lecture 15 :** test

Week 6

**Lecture 16:** Absolute Zero,

**Lecture 17:** Entropy, show that dQ/T=O, T-S diagramNernst heat law,

**Lecture 18:** Joule’s free expansion, Joule Thomson (Porous plug)experiment. Joule - Thomson effect.

Week 7

**Lecture 19:**  Liquefication of gases.

**Lecture 20:** Liquification of gases Contt.

**Lecture 21:** Test

Week 8

**Lecture 22:** Air pollution due to internalcombustionEngine.

**Lecture 23 :Unit III-**Thermodynamics-II : Derivation of Clausius – Claperyron Equation latent heat equation

**Lecture 24 :test**

Week 9

**Lecture 25:**. Phase diagram

**Lecture 26:** triple point of a substance.

**Lecture 27 :** test

Week 10

**Lecture 28:** Development of Maxwellthermodynamicalrelations.

**Lecture 29: contt.**Development of Maxwellthermodynamicalrelations.

**Lecture 30:**ApplicationofMaxwellrelationsinthederivationof relationsbetweenentropy,specificheatsandthermodynamicvariables.

Week 11

**Lecture 31:** Test

**Lecture 32:** Thermodynamic functions : Internal energy (U), Helmholtz function (F),

**Lecture 33** Enthalpy(H),Gibbsfunction(G)andthe relations betweenthem.

Week 12

**Lecture 34: Test**

**Lecture 35: Revision lecture**

**Lecture 36: Test**

# References:

1. Rajaraman,FortranProgramming.
2. SchaumSeries,Fortran77.
3. RamKumar,ProgrammingwithFortran-77.
4. S.LokanathanandR.S.,Gambir,StatisticalandThermalPhysics(AnIntroduction),PrenticeHallofIndia,Pvt.,Ltd.(1991,NewDelhi).
5. J.K.SharmaandK.K.Sarkar,ThermodynamicsandstatisticalPhysics,Himalaya PublishingHouse(1991,Bombay.)
6. M.W.ZemanskyandR.Dittman,HeatandThermodynamics,McGrawHill,NewYork (1981).

# Lesson plan Paper-IIPHY302

**Optics–I**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan

# Session: 2020-21

Week 1

**Lecture 1:** Unit-I: Fourier Analysis and Fourier Transforms : Speed of transverse waves on auniform string.

**Lecture 2:** Speed of longitudinal waves in a fluid

**Lecture 3:** superposition of waves(physical idea)

Week 2

**Lecture 4:**  Fourier Analysis of complex waves

**Lecture 5:** Fourier Analysis application for thesolution of triangular

**Lecture 6:** : Fourier Analysis rectangular waves,

Week 3

**Lecture 7: Application of Fourier analysis to** half wave rectifier output

**Lecture 8** : **Application of Fourier analysis to** full wave rectifier out puts.

**Lecture 9**: Test

Week 4

**Lecture 10:**Fouriertransformsanditsproperties.

**Lecture 11:** Applicationoffouriertransformtofollowing function.

(I)

f(x) =

e-x2/2

**Lecture 12:** Applicationoffouriertransformtofollowing function.

f(x) = I[x]<a

0[x]>a

Week 5

**Lecture 13: Unit II Geometrical optics : Introduction to** GeometricalOptics:

**Lecture 14:** Matrixmethodsinparaxialoptics,

**Lecture 15:** effectsoftranslationand refraction,

Week 6

**Lecture 16:** Test

**Lecture 17 :**derivation of thin lens and thick lens formulae using matrix method,

**Lecture 18:** unit plane, nodalplanes, system of thin lenses,

Week 7

**Lecture 19:** Chromatic,

**Lecture 20:** spherical

**Lecture 21:** coma,

Week 8

**Lecture 22:** astigmatism and

**Lecture 23:**distortionaberrationsand theirremedies.

**Lecture 24:** Test

Week 9

**Lecture 25:** Unit Interference : Introduction to Interference

**Lecture 26:** Interference by Division of Wavefront : Young’s Double slit Experiment

**Lecture 27:** Fringe width in Young’s Double slit experiment

Week 10

**Lecture 28:** Interference of white light vs monochromatic light and law of conservation of energy in interference

**Lecture 29 :** Fresnel’s Biprism

**Lecture 30:** Applications of Fresnel’s Biprism in determinationofwavelengthofsodiumlight

Week 11

**Lecture 31:**Application of Frenel’s Bi-prism in determination of thicknessofmica sheet,

**Lecture 32:**Lioyd’smirror,

**Lecture 33:** phase change on reflection.

Week 12

**Lecture 34:** Difference Between interference by Liyod mirror and Frsenel’s Bi-prism

**Lecture 35:** Revision

**Lecture 36:** Test

# References

1. MathematicalPhysicsbyB.S.RajputandYogPrakashPragatiPrakashan.
2. TheoryandProblemsofLaplaceTransformsbyMurrariR.spiegel,McGrawHillBook Company.
3. OpticsbyAjayGhatak,TataMcGrawHill1977.
4. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: QUANTUM MECHANICS SUBJECT CODE: PHY 502 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2020-2021**

**FACULTY: Dr Parminder/Dr Monika Malik**

**WEEK 1**

**LECTURE 1: UNIT-1:** Failure of (Classical) E.M. Theory, quantum theory of radiation (old quantum theory)

**LECTURE 2:** Photon, photoelectric effect and Einstein’s photoelectric equation

**LECTURE 3:** Compton Effect (theory and result)

**WEEK 2**

**LECTURE 4:** Inadequancy of old quantum theory, de-Broglie hypothesis

**LECTURE 5:** Davisson and Germer experiment, G.P. Thomson experiment

**LECTURE 6:** Phase velocity group velocity

**WEEK 3**

**LECTURE 7:** Heisenberg's uncertainty principle

**LECTURE 8:** Time-energy and angular momentum

**LECTURE 9:** position uncertainty, Uncertainty principle

**WEEK 4**

**LECTURE 10:** de-Broglie wave, (wave-particle duality).Gamma Ray Microscope

**LECTURE 11:** Electron diffraction from a slit

**LECTURE 12: TEST**

**WEEK 5**

**LECTURE13:** Derivation of time dependent Schrodinger wave equation

**LECTURE 14:** Derivation of time- independent Schrodinger wave equation

**LECTURE 15:** Discussion of Schrodinger wave equation

**WEEK 6**

**LECTURE 16:** Eigen values, Eigen functions, wave functions and its significance.

**LECTURE 17:** Normalization of wave function

**LECTURE 18:** concept of observable and operator

**WEEK 7**

**LECTURE 19:** Solution of Schrodinger equation

**LECTURE 20:** equation for harmonic oscillator excited states

**LECTURE 21:** equation for harmonic oscillator ground states

**WEEK 8**

**LECTURE 22:** Application of Schrodinger equation in the solution of the following one-dimensional problems

**LECTURE 23:** Schrodinger equation in the solution of the following 2-dimensional problems

**LECTURE 24:** Discussion ofSchrodinger equation in the solution of the following 2-dimensional problems

**WEEK 9**

**LECTURE 25:** Free particle in one dimensional box

**LECTURE 26:** Free particle in two dimensional box

**LECTURE 27:** Free particle in three dimensional box

**WEEK 10**

**LECTURE 28:** Problem class

**LECTURE 29:** solution of Schrödinger wave equation, Eigen function, Eigen values

**LECTURE 30:** solution of Schrödinger wave equation quantization of energy and momentum

**WEEK 11**

**LECTURE 31:** solution of Schrödinger wave equation nodes and antinodes, zero point energy

**LECTURE 32:** One-dimensional potential barrier E>V0 (Reflection and Transmission coefficient.

**LECTURE 33:** One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakagecoefficient,penetration depth).

**WEEK 12**

**LECTURE 34:** Revision

**LECTURE 35:** Test

**LECTURE 36:** Test

## References:

1. Quantum Mechanics by L.I.Schiff, McGraw Hill Book Company, Inc.
2. Quantum Mechanics by B. Crasem and J. D.Powel (Addison Wesley.
3. QuantumMechanics byA.P. Messiah

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: SOLID STATE PHYSICS SUBJECT CODE: PHY 501 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2020-2021 SECTION: - A**

**FACULTY: Mr Vivek/Dr Monika Malik**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Crystalline and glassy forms, liquid crystals
* **LECTURE 2:**Crystal structure, periodicity, lattice, and basis
* **LECTURE 3:**Crystal translational vectors

**WEEK 2**

* **LECTURE 4:**Crystal translational axes
* **LECTURE 5:**Unit cell and primitive cell
* **LECTURE 6:**Winger Seitz primitive Cell

**WEEK 3**

* **LECTURE 7:**Symmetry operations for a two-dimensional crystal
* **LECTURE 8:**Bravais lattices in two dimensions
* **LECTURE 9:**Bravais lattices in three dimensions

**WEEK 4**

* **LECTURE 10:TEST**
* **LECTURE 11:**Crystal planes
* **LECTURE 12:** Detail Information of Miller indices

**WEEK 5**

* **LECTURE 13:** Formation of Interplanar spacing
* **LECTURE 14:** Crystal structures of Zinc sulphide
* **LECTURE 15:** Crystal structures of Sodium Chloride

**WEEK 6**

* **LECTURE 16: :** Crystal structures of Diamonds.
* **LECTURE 17:** X-ray diffraction
* **LECTURE 18:** Bragg's Law

**WEEK 7**

* **LECTURE 19:** Experimental x-ray diffraction methods
* **LECTURE 20**: K-space
* **LECTURE 21: TEST**

**WEEK 8**

* **LECTURE 22:** Reciprocal lattice and its physical significance
* **LECTURE 23:** Reciprocal lattice vectors
* **LECTURE 24:** Reciprocal lattice to a simple cubic lattice

**WEEK 9**

* **LECTURE 25:** Reciprocal lattice to B C C
* **LECTURE 26:** Reciprocal lattice to F C C
* **LECTURE 27:** Relation between three lattices

**WEEK 10**

* **LECTURE 28:** Introduction to specific heat of solids
* **LECTURE 29:** Dulong and Pettit’s law of specific heat of solids and its drawbacks
* **LECTURE 30:** Einstein's theory of specific heat

**WEEK 11**

* **LECTURE 31:** Drawbacks of Einstein theory of specific heat
* **LECTURE 32:** Debye model of specific heat of solids.
* **LECTURE 33:** Comparison of three theories of specific heats of solids.

**WEEK 12**

* **LECTURE 34: Test**
* **LECTURE 35: Revision**
* **LECTURE 36: Test**

## References:

1. Introduction to solid state Physics (5th Ed.) by kittel, Wiley eastern Limited.

**Lesson Plan**

**Semester II ,**

**Paper I- PHY 201 :** Properties of Matter, Kinetic theory and Relativity

# Teacher Name : Mrs Innu Yadav/Dr Priyanka Dhawan

# Session: 2020-21

*Week 1*

**Lecture 1**: Unit-I : **:** Elasticity, Hooke’s law

**Lecture 2**: Elastic constants and their relations

**Lecture 3**: Poisson’s ratio, torsion of cylinder and twisting couple

*Week 2*

**Lecture 4**: ,Topic continued from Lecture 3

**Lecture 5** : Bending of beam (bending moment and its magnitude) cantilevers

**Lecture 6**: Centrally loaded beam.

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**:**: Unit-2 :** Assumptions of Kinetic Theory of gases, Law of equipartition of energy and its applications for specific heats of gases.

**Lecture 11** Topic continued.

**Lecture 12**: Maxwell distribution of speeds and velocities (derivation required).

*Week 5*

**Lecture 13:**Unit-1 (Internal Assessment- Test)

**Lecture 14:**Experimental verification of Maxwell’s Law of speed distribution

**Lecture 15 :**Most probable speed, Average and r.m.s. speed

*Week 6*

**Lecture 16:**Mean free path. Transport of energy and momentum,

**Lecture 17** Diffusion of gases. Brownian motion (qualitative)

**Lecture 18**. Real gases, Van der Waal’s equation.

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:**Student’s problems related to Unit-2

**Lecture 21:**Reference systems, inertial frames.

*Week 8*

**Lecture 22:Unit 3:** Galilean invariance and Conservation laws

**Lecture 23:** Newtonian relativity principle

**Lecture 24:** Michelson - Morley experiment: Search for ether.

*Week 9*

**Lecture 25:**. Unit-2 (InternalAssessment- Test)

**Lecture 26:**Topic continued from Lecture 24

**Lecture 27 :**Lorentz transformations

*Week 10*

**Lecture 28:** Length contraction.

**Lecture 29:** Time dilation.

**Lecture 30:** Velocity addition theorem, variation of mass with velocity and mass energy equivalence.

*Week 11*

**Lecture 31:**Topic continued.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (Vth Edition) by Mark W. Zemansky.
3. Berkeley Physics Course, Vol.-I Mechanics by E.M. Purchell.

**Lesson Plan**

# SemesterII, PaperII-PHY-202:ELECTROMAGNETIC

# INDUCTIONANDELECTRONICDEVICES

# Teacher Name: Dr Kartar singh/Dr Priyanka Dhawan

# Session: 2020-21

Week 1

**Lecture 1:**Growthanddecayofcurrentinacircuit with(a)Capacitanceand resistance (b)

resistance and inductance

**Lecture 2**: (c) Capacitance and inductance (d) Capacitanceresistanceandinductance.

**Lecture 3**: AC circuit analysis using complex variables with (a) capacitance and resistance,

Week 2

**Lecture 4**: (b) resistanceandinductance(c)capacitanceandinductance(d)capacitance,

inductance

**Lecture 5** : andresistanceSeriesandparallelresonantcircuit.

**Lecture 6**: Qualityfactor (Sharpnessof resonance).

Week 3

**Lecture 7**: Energybandsinsolids.

**Lecture 8**: Intrinsicandextrinsicsemiconductor,Halleffect,

**Lecture 9**: P-Njunctiondiode andtheirV-Icharacteristics.

Week 4

**Lecture 10**: Zenerandavalanchebreakdown. Resistance of a diode,

**Lecture 11**: Light Emitting diodes (LED). Photo conduction in semiconductors,photodiode,Solar Cell

**Lecture 12**: P-Njunctionhalfwaveandfullwaverectifier.

Week 5

**Lecture 13:** Typesoffiltercircuits(Land-withtheory).

**Lecture 14:**Zenerdiodeasvoltageregulator,simpleregulatedpowersupply.

**Lecture 15 :Transistors :** Junction Transistors, Bipolar transistors,

Week 6

**Lecture 16:** working of NPN and PNP transistors,

**Lecture 17:**Transistor connections(C-B, C-E, C-C mode

**Lecture 18:**), constants of transistor. Transistor characteristic curves (excluding h parameter analysis),

Week 7

**Lecture 19:** advantageof C-Bconfiguration.C.R. O.(Principle, constructionandworkingin detail).

**Lecture 20: Test**

**Lecture 21:** Transistor Amplifiers : Transistor biasing

Week 8

**Lecture 22:**, methods of Transistor biasing and stabilization. D.C.load line

**Lecture 23 :** . Common-base and common-emitter transistor biasing.

**Lecture 24 :** Common-base, common-emitteramplifiers.

Week 9

**Lecture 25:**. Classification of amplifiers.

**Lecture 26:**Resistance-capacitance (R-C) coupled amplifiertwostage

**Lecture 27 :**;conceptofbandwidth,noderivation).

Week 10

**Lecture 28:**. Feed-backinamplifiers,

.**Lecture 29:** advantageofnegativefeedbackEmitterfollower.

**Lecture 30:**Oscillators:Oscillators,PrincipleofOscillation,

Week 11

**Lecture 31:**ClassificationofOscillator.

**Lecture 32:** Conditionforself-sustained oscillation

**Lecture 33:**: Barkhousen Criterion for oscillations.

Week 12

**Lecture 34:** Tuned collector common emitteroscillator.Hartleyoscillator. Colpitt’s

oscillator

**Lecture 35: Doubt class & Numerical problems discussion**

**Lecture 36: Test**

# References:

1. ElectricityandMagnetismbyReitzandMilford(PrenticeHallofIndia)
2. ElectricityandMagnetismbyA.S.MahajanandA.A.Rangwala(TataMcGrawHill).
3. BasicElectronicsandLinearcircuitsbyN.N.Bhargava,D.C.KulshreshthaandS.C.Gupta(TITI, CHD).
4. SoildStateElectronicsbyJ.P.Agarwal,AmitAgarwal(PragatiPrakashan,Meerut).
5. ElectronicFundamentalsandApplicationsbyJ.D.Ryder(PrenticeHallIndia)

**LESSON PLAN**

**Semester IV, PAPER PH 401 : STATISTICAL MECHANICS**

**Teacher’s Name :Dr Anu Chauhan/Mrs Pooja**

**Session: 2020-21**

**WEEK 1**

**Lecture 1** : Unit-IIntroduction: Probability,someprobabilityconsiderations

**Lecture 2** : Combinationspossessingmaximum probability, combinations possessing

minimum probability

**Lecture 3** : Distribution ofmoleculesintwoboxes.

**WEEK 2**

**Lecture 4 :** Casewith weightage (general).

**Lecture 5** : Phase space,microstates and macrostates

**Lecture 6** : statistical fluctuations

**WEEK 3**

**Lecture 7 :** constraints and accessibleStates

**Lecture 8** : Thermodynamicalprobability

**Lecture 9** : Numerical of unit-II will be discussed

**WEEK 4**

**Lecture 10 :** Revision of unit-I

**Lecture 11** : Test of unit-I

**Lecture 12**: Postulates of Statistical Physics, Division of Phase space into cells

**WEEK 5**

**Lecture 13 :** Condition ofequilibrium between two system in thermal contact. b-Parameter

**Lecture 14** : Entropy andProbability

**Lecture 15** : Boltzmann’s distribution law. Evaluation of A and b

**WEEK 6**

**Lecture 16 :**  Bose-Einsteinstatistics

**Lecture 17** : ApplicationofB.E.StatisticstoPlanck’sradiationlaw

**Lecture 18** : B.E.gas.

**WEEK 7**

**Lecture 19 :** Numerical of unit 2

**Lecture 20** : Test of unit 2

**Lecture 21** : Fermi-Dirac statistics

**WEEK 8**

**Lecture 22 :** M.B. Law as limiting case of B.E. statistics

**Lecture 23** : Degeneracy

**Lecture 24** : B.E.Condensation

**WEEK 9**

**Lecture 25 :** Fermi- DiracGas

**Lecture 26** : Electrongasinmetals

**Lecture 27** : Zeropointenergy

**WEEK 10**

**Lecture 28 :** Specificheatofmetalsandits solution

**Lecture 29** : Numerical of unit 3

**Lecture 30** : Revision of unit-3

**WEEK 11**

**Lecture 31 :** Revision of unit-I

**Lecture 32** : Revision of unit-II

**Lecture 33** : Revision of unit-III

**WEEK 12**

**Lecture 34:** Quiz of unit I

**Lecture 35:** Quiz of unit II

**Lecture 36:** Quiz of unit III

**References:**

1. B.B.Laud,“IntroductiontoStatisticalMechanics”(Macmillan1981).
2. F.Reif,“StatisticalPhysics’(McGrawHill1988).
3. K.Huang,“StatisticalPhysics”(WileyEaster 1988).

**Lesson Plan**

**SemesterIV , PaperII-PHY 402: Optics-2**

# Teacher Name : Mrs Pooja/Dr Anu Chauhan

# Session: 2020-21

Week 1

**Lecture 1**: Unit-I : Introduction

**Lecture 2**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film

**Lecture 3**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film(contd.)

Week 2

**Lecture 4**: Newton’srings

**Lecture 5** : Interferometers:Michelson’sinterferometerand

**Lecture 6**: itsapplicationto

(I) Standardization of a meter (II) determination of wave length

Week 3

**Lecture 7**:itsapplicationto

(I) Standardization of a meter (II) determination of wave length(contd.)

**Lecture 8**: Fresnel’sDiffraction (introduction)

**Lecture 9**: Fresnel’shalfperiodzones

Week 4

**Lecture 10**: zoneplate,diffractionatastraightedge

**Lecture 11**: rectangularslit and circular aperture.

**Lecture 12**: Unit test

Week 5

**Lecture 13:** Unit-2, Fraunhofer diffraction(introduction)

**Lecture 14:** One slit diffraction

**Lecture 15 :** Two slit diffraction

Week 6

**Lecture 16:** N-slit diffraction,

**Lecture 17:** Plane transmission granting spectrum

**Lecture 18:** Dispersive power of a grating

Week 7

**Lecture 19:**  Limit ofresolution

**Lecture 20:** Rayleigh’scriterion

**Lecture 21:** resolvingpoweroftelescopeandagrating

Week 8

**Lecture 22:**Revision and Doubt class

**Lecture 23:**Revision and Doubt class

**Lecture 24 :**test

Week 9

**Lecture 25:** Introduction to wave nature of light

**Lecture 26:** Polarisation and Double Refraction

**Lecture 27:** Polarisation by reflection

Week 10

**Lecture 28:** Polarisation by scattering

**Lecture 29:** Malus law, Phenomenon of double refraction

**Lecture 30:**Huygen’s wave theory of double refraction (Normal and oblique incidence)

Week 11

**Lecture 31:** Analysis of Palorised light : Nicol prism

**Lecture 32:** Quarter wave plate and half wave plate

**Lecture 33:** production and detection of (i) Plane polarized light (ii) Circularly polarized lightand (iii)Elliptically polarized light,

Week 12

**Lecture 34:** Optical activity, Fresnel’s theory of rotation

**Lecture 35:** Specificrotation,Polarimeters(halfshade and Bi-quartz).

**Lecture 36:** Test

# References:

1. OpticsbyAjayGhatak,TataMcGrawHill1977.
2. IntroductionofOpticsbyFrankL.PedrottiandLenoS.Pedrotti,PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: ATOMICMOLECULARANDLASERPHYSICS SUBJECT CODE: PHY 601 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2020-2021 SECTION: - A**

**FACULTY: Mr Vivek**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Vector atom model
* **LECTURE 2:**Quantum numbers associated with vector atom model
* **LECTURE 3:**Penetrating orbits (qualitiative description)

**WEEK 2**

* **LECTURE 4:**Non- penetrating orbits (qualitiative description)
* **LECTURE 5:**Spectral lines in different series of ailkali spectra
* **LECTURE 6:**Continue (Spectral lines in different series of ailkali spectra)

**WEEK 3**

* **LECTURE 7:**Spin orbit interactionand doublet term separation
* **LECTURE 8:**LS or Russel-Saunder Coupling (expressions for interaction energies)
* **LECTURE 9::**JJ Coupling (expressions for interaction energies)

**WEEK 4**

* **LECTURE 10:Test**
* **LECTURE 11:**Zeeman effect (normal and Anormalous)
* **LECTURE 12:** Zeeman pattern of D 1 and D2 lines of Na-atom

**WEEK 5**

* **LECTURE 13:** Paschen, Back effect of a single valence electron system
* **LECTURE 14:** Weak field Strak effect of Hydrogen atom
* **LECTURE 15:** Diseete set of electronic energies of molecules

**WEEK 6**

* **LECTURE 16:** Quantisation of Vibrational energies
* **LECTURE 17:** Quantisation of ratiationalenergies
* **LECTURE 18:** Raman effect (Quantitative description)

**WEEK 7**

* **LECTURE 19:** Stoke's lines
* **LECTURE 20**: Anti Stoke's lines
* **LECTURE 21: Test**

**WEEK 8**

* **LECTURE 22:** Main features of a laser : Directionality, high intensity
* **LECTURE 23:** High degree of coherence
* **LECTURE 24:** Spatial and temporal coherence

**WEEK 9**

* **LECTURE 25:** Einstein's coefficients
* **LECTURE 26:** Possibility of amplification
* **LECTURE 27:** Momentum transfer, life time of a level

**WEEK 10**

* **LECTURE 28:** Kinetics of optical obsorption
* **LECTURE 29:** Threshold condition for laser emission
* **LECTURE 30:** Laser pumping

**WEEK 11**

* **LECTURE 31:** He-Ne laser (Principle, Construction and Working).
* **LECTURE 32:** RUBY laser (Principle, Construction and Working).
* **LECTURE 33:** Applications of laser in the field of medicine and industry.

**WEEK 12**

* **LECTURE 34: Revision**
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Introduction to Atomic and Molecular Spectroscopy by V.K.Jain, Narosa (2007)
2. Introduction to Atomic Spectra by H.B. White.
3. Atomic spectra by G. Herzberg.
4. Molecular Spectra and Molecular Structure by G. Herzberg.
5. Fundamentals of molecular spectroscopy by Colin N. Banwell and Elaine M.Mc-Cash.
6. Lassers, Theory and Application (2nd Ed.) by Thagrajan and Ajay Ghatak.
7. Laser and Nonlinear Optics by B.B. Laud (2nd Ed.)
8. Introduction to Optics by Frank L. Pedrotti and Lens S. Pedrotti, Prentice Hall, 1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: NUCLEAR PHYSICS SUBJECT CODE: PHY 602 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2020-2021**

**FACULTY: Dr Parminder**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Nuclear mass and binding energy
* **LECTURE 2:**Systematics nuclear binding energy
* **LECTURE 3:**Nuclear stability

**WEEK 2**

* **LECTURE 4:**Detail discussion of Nuclear size
* **LECTURE 5:**Nuclear spin, parity
* **LECTURE 6:**Statistics magnetic dipole moment, quadrupole moment (shape concept)

**WEEK 3**

* **LECTURE 7:**Determination of mass by Bain-Bridge
* **LECTURE 8:**Bain-Bride and Jordan mass spectrograph
* **LECTURE 9:**Determination of charge by Mosley law

**WEEK 4**

* **LECTURE 10:**Determination of size of nuclei by Rutherford Back Scattering
* **LECTURE 11:Test**
* **LECTURE 12:** Interaction of heavy charged particles (Alpha particles)

**WEEK 5**

* **LECTURE 13:** Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula)
* **LECTURE 14:** Energetics of alpha-decay, Range and straggling of alphaparticles
* **LECTURE 15:** Geiger-Nuttal law

**WEEK 6**

* **LECTURE 16:** Introduction of Beta-particle, Origin of continuous beta-spectrum (neutrino hypothesis).
* **LECTURE 17:** Types of beta decay and energetics of beta decay
* **LECTURE 18:** Energy loss of beta- particles (ionization), Range of electrons, absorption of beta-particles

**WEEK 7**

* **LECTURE 19:** Interaction of Gamma Ray, Nature of gamma rays
* **LECTURE 20**: Energetics of gamma rays, passage of Gamma radiations through matter by photoelectric effect.
* **LECTURE 21:** Energetics of gamma rays, passage of Gamma radiations through matter by compton effect

**WEEK 8**

* **LECTURE 22:** Energetics of gamma rays, passage of Gamma radiations through matter by pair production effect
* **LECTURE 23:** Asborption of Gamma rays (Mass attenuation coefficient) and its application
* **LECTURE 24:** Nuclear reactions, Elastic scattering

**WEEK 9**

* **LECTURE 25:** Inelastic scatting, Nuclear disintegration
* **LECTURE 26:** Photoneuclear reaction, Radiative capture
* **LECTURE 27:** Direct reaction, heavy ion reactions and spallation Reactions

**WEEK 10**

* **LECTURE 28:** Conservation laws. Q-value and reaction threshold
* **LECTURE 29:** Nuclear Reactors General aspects of Reactor design
* **LECTURE 30:** Nuclear fission and fusion reactors (Principles, construction, working and use)

**WEEK 11**

* **LECTURE 31:** Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators
* **LECTURE 32:** Ionization chamber, proportional counter.
* **LECTURE 33:** G.M. counter detailed study.

**WEEK 12**

* **LECTURE 34:** Scintillation counter and semiconductor detector.
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Atomic and nuclear Physics, Vol. II by S.N. Ghashal.
2. Nuclear Physics by D.C. Tayal, Umesh Prakashan, 125, Goblind Dev Khurja (UP).
3. Concept of Modern physics by arther Besier, Tata McGraw Hill Publications.
4. Nuclear Physics by W.E. Burcham.
5. Nuclear Radiation Detectors by S.S. Kapoor
6. Experimental Nuclear Physics by M. Singru.

**Lesson Plan**

**Semester I , Paper I- PHY 101 : Mechanics**

# Teacher Name : Dr Parminder Singh

# Session: 2021-22

*Week 1*

**Lecture 1**: Unit-I : Mechanics of single and system of particles.

**Lecture 2**: Conservation of laws of linear momentum.

**Lecture 3**: Angular momentum and Mechanical energy.

*Week 2*

**Lecture 4**: ,Centre of mass and equation of motion

**Lecture 5** : Constrained motion

**Lecture 6**: Degrees of freedom

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**: Generalised coordinates, displacement, velocity

**Lecture 11** Generalised acceleration, momentum.

**Lecture 12**: Generalised force and potential.

*Week 5*

**Lecture 13:**Unit-1 (Internal Assesment- Test)

**Lecture 14:**Hamilton’s variational principle

**Lecture 15 :**Lagrange’s equation of motion from Hamilton’s Principle.

*Week 6*

**Lecture 16:**Linear Harmonic oscillator, simple pendulum,

**Lecture 17** Atwood’s machine.

**Lecture 18**. Numerical Problems from Unit-2

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:** Students problems related to Unit-2

**Lecture 21:**Rotation of Rigid body

*Week 8*

**Lecture 22:**Moment of inertia.

**Lecture 23:** Torque, angular momentum

**Lecture 24:** Kinetic energy of rotation.

*Week 9*

**Lecture 25:**. Unit-2 ( Internal Assesment- Test)

**Lecture 26:**Theorems of perpendicular and parallel axes with proof

**Lecture 27 :**Moment of inertia of solid sphere

*Week 10*

**Lecture 28:** Moment of inertia of Hollow sphere and Spherical shell.

**Lecture 29:** Moment of inertia ofsolid cylinder, hollow cylinder

**Lecture 30:** Moment of Inertia solid bar of rectangular cross-section.

*Week 11*

**Lecture 31:**Acceleration of a body rolling down on an inclined plane.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Classical Mechanics by V.K.Jain (Ane 2009)
2. Classical Mechanics by H. Goldstein (2nd Edition)
3. Berkeley Physics Course, Vol. I, Mechanics by E.M. Purchell

**Lesson Plan**

# PaperII-PHY102:ELECTRICITYANDMAGNETISM

# Teacher Name : Dr Parminder Singh

# Session: 2021-22

*Week 1*

**Lecture 1**: Unit-I : **Mathematical Background :** Scalars and Vectors, dot and cross product,

**Lecture 2:**Triple vectorproduct, Scalar and Vector fields,

**Lecture 3:** Differentiation of a vector, Gradient of a scalar and itsphysical significance,

*Week 2*

**Lecture 4:**Integration of a vector (line, surface and volume integral and theirphysicalsignificance),

**Lecture 5:**Gauss’s divergencetheorem

**Lecture 6:**andStockstheorem.

*Week 3*

**Lecture 7:Electrostatic Field :** Derivation of field E from potential as gradient,

**Lecture 8:**derivation ofLaplace and Poisson equations. Electric flux,

**Lecture 9:** Gauss’s Law and its application tospherical shell,

*Week 4*

**Lecture 10:** uniformly charged infinite plane and uniformity charged straight wire,mechanicalforceof chargedsurface,

**Lecture 11:**Energyperunitvolume.

**Lecture 12: Test**

*Week 4*

**Lecture 12:**Unit II: **Magnetostatistics :** Magnetic Induction, magetic flux,

**Lecture 13:** Unit solenoidal nature of Vector fieldof induction.

**Lecture 14:** PropertiesofB

*Week 5*

**Lecture 15:** Electronic theory of dia andpara magnetism (Langevin’s theory).

**Lecture 16:**Domain theory of ferromagnetism.

*Week 6*

**Lecture 17:** Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 18:** Contt.. Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 19 :** Discussion on previous years question from unit II

*Week 7*

**Lecture 20:** Test

**Lecture 21:**UnitIII**Electromagnetic Theory : Introduction**

**Lecture 22:** Maxwell equation and their derivations,

*Week 8*

**Lecture 23:** Contt.. Maxwell equation and their derivations,

**Lecture 24:Contt..**Maxwell equation and their derivations,

**Lecture 25:Test**

*Week 9*

**Lecture 26:** DisplacementCurrent.

**Lecture 27:** Vectorandscalarpotentials,

**Lecture 28 :** Contt. Vectorandscalarpotentials,

*Week 10*

**Lecture 29:**boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 30 :** contt boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 31:** Contt. boundaryconditionsatinterfacebetweentwodifferentmedia,

*Week 11*

**Lecture 32: Contt**boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 33:** Propagationofelectromagneticwave(Basicidea,noderivation).

*Week 12*

**Lecture 34 :**PoyntingvectorandPoyntingtheorem.

**Lecture 35:** Revision

**Lecture 36:** Test

# References:

1. ElectricityandMagnetism byReitzandMilford(PrenticeHallofIndia)
2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill).

**Lesson Plan**

**SemesterIII , PaperI-PHY301:ComputerProgramming,Thermodynamics**

# Teacher Name : Dr Monika Malik and Mrs Pooja

# Session: 2021-22

Week 1

**Lecture 1**: Unit-I : ComputerProgramming:Computerorganization,Binaryrepresentation

**Lecture 2**: Algorithm development,

**Lecture 3**: flowchartsand theirinterpretation.

Week 2

**Lecture 4**: Flowchart and algorithm-based problems

**Lecture 5** :Fortran Preliminaries: Integer and floating point arithmetic expression, **Lecture 6**: built infunctions executable and non-executable statements,input and outputstatements,

Week 3

**Lecture 7**: Formats,

**Lecture 8**: I.F.and GO TO statements,

**Lecture 9**: Do statement

Week 4

**Lecture 10**: Dimension, arrays statement

**Lecture 11**: Function andfunctionsubprogram.

**Lecture 12**: Test

Week 5

**Lecture 13:**Unit-II Thermodynamics-I:Secondlawofthermodynamics,

**Lecture 14:**Carnottheorem,Absolute scale of temperature,

**Lecture 15 :** test

Week 6

**Lecture 16:** Absolute Zero,

**Lecture 17:** Entropy, show that dQ/T=O, T-S diagramNernst heat law,

**Lecture 18:** Joule’s free expansion, Joule Thomson (Porous plug)experiment. Joule - Thomson effect.

Week 7

**Lecture 19:**  Liquefication of gases.

**Lecture 20:** Liquification of gases Contt.

**Lecture 21:** Test

Week 8

**Lecture 22:** Air pollution due to internalcombustionEngine.

**Lecture 23 :Unit III-**Thermodynamics-II : Derivation of Clausius – Claperyron Equation latent heat equation

**Lecture 24 :test**

Week 9

**Lecture 25:**. Phase diagram

**Lecture 26:** triple point of a substance.

**Lecture 27 :** test

Week 10

**Lecture 28:** Development of Maxwellthermodynamicalrelations.

**Lecture 29: contt.**Development of Maxwellthermodynamicalrelations.

**Lecture 30:**ApplicationofMaxwellrelationsinthederivationof relationsbetweenentropy,specificheatsandthermodynamicvariables.

Week 11

**Lecture 31:** Test

**Lecture 32:** Thermodynamic functions : Internal energy (U), Helmholtz function (F),

**Lecture 33** Enthalpy(H),Gibbsfunction(G)andthe relations betweenthem.

Week 12

**Lecture 34: Test**

**Lecture 35: Revision lecture**

**Lecture 36: Test**

# References:

1. Rajaraman,FortranProgramming.
2. SchaumSeries,Fortran77.
3. RamKumar,ProgrammingwithFortran-77.
4. S.LokanathanandR.S.,Gambir,StatisticalandThermalPhysics(AnIntroduction),PrenticeHallofIndia,Pvt.,Ltd.(1991,NewDelhi).
5. J.K.SharmaandK.K.Sarkar,ThermodynamicsandstatisticalPhysics,Himalaya PublishingHouse(1991,Bombay.)
6. M.W.ZemanskyandR.Dittman,HeatandThermodynamics,McGrawHill,NewYork (1981).

# Lesson plan Paper-IIPHY302

**Optics–I**

# Teacher Name : Mr Vivek and Dr. Monika Malik

# Session: 2021-22

Week 1

**Lecture 1:** Unit-I: Fourier Analysis and Fourier Transforms : Speed of transverse waves on auniform string.

**Lecture 2:** Speed of longitudinal waves in a fluid

**Lecture 3:** superposition of waves(physical idea)

Week 2

**Lecture 4:**  Fourier Analysis of complex waves

**Lecture 5:** Fourier Analysis application for thesolution of triangular

**Lecture 6:** : Fourier Analysis rectangular waves,

Week 3

**Lecture 7: Application of Fourier analysis to** half wave rectifier output

**Lecture 8** : **Application of Fourier analysis to** full wave rectifier out puts.

**Lecture 9**: Test

Week 4

**Lecture 10:**Fouriertransformsanditsproperties.

**Lecture 11:** Applicationoffouriertransformtofollowing function.

(I)

f(x) =

e-x2/2

**Lecture 12:** Applicationoffouriertransformtofollowing function.

f(x) = I[x]<a

0[x]>a

Week 5

**Lecture 13: Unit II Geometrical optics : Introduction to** GeometricalOptics:

**Lecture 14:** Matrixmethodsinparaxialoptics,

**Lecture 15:** effectsoftranslationand refraction,

Week 6

**Lecture 16:** Test

**Lecture 17 :**derivation of thin lens and thick lens formulae using matrix method,

**Lecture 18:** unit plane, nodalplanes, system of thin lenses,

Week 7

**Lecture 19:** Chromatic,

**Lecture 20:** spherical

**Lecture 21:** coma,

Week 8

**Lecture 22:** astigmatism and

**Lecture 23:**distortionaberrationsand theirremedies.

**Lecture 24:** Test

Week 9

**Lecture 25:** Unit Interference : Introduction to Interference

**Lecture 26:** Interference by Division of Wavefront : Young’s Double slit Experiment

**Lecture 27:** Fringe width in Young’s Double slit experiment

Week 10

**Lecture 28:** Interference of white light vs monochromatic light and law of conservation of energy in interference

**Lecture 29 :** Fresnel’s Biprism

**Lecture 30:** Applications of Fresnel’s Biprism in determinationofwavelengthofsodiumlight

Week 11

**Lecture 31:**Application of Frenel’s Bi-prism in determination of thicknessofmica sheet,

**Lecture 32:**Lioyd’smirror,

**Lecture 33:** phase change on reflection.

Week 12

**Lecture 34:** Difference Between interference by Liyod mirror and Frsenel’s Bi-prism

**Lecture 35:** Revision

**Lecture 36:** Test

# References

1. MathematicalPhysicsbyB.S.RajputandYogPrakashPragatiPrakashan.
2. TheoryandProblemsofLaplaceTransformsbyMurrariR.spiegel,McGrawHillBook Company.
3. OpticsbyAjayGhatak,TataMcGrawHill1977.
4. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: QUANTUM MECHANICS SUBJECT CODE: PHY 502 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2021-2022**

**FACULTY: Dr. ANU CHAUHAN, Mrs. INNU YADAV & Dr. PRIYANKA DHAWAN**

**WEEK 1**

**LECTURE 1: UNIT-1:** Failure of (Classical) E.M. Theory, quantum theory of radiation (old quantum theory)

**LECTURE 2:** Photon, photoelectric effect and Einstein’s photoelectric equation

**LECTURE 3:** Compton Effect (theory and result)

**WEEK 2**

**LECTURE 4:** Inadequancy of old quantum theory, de-Broglie hypothesis

**LECTURE 5:** Davisson and Germer experiment, G.P. Thomson experiment

**LECTURE 6:** Phase velocity group velocity

**WEEK 3**

**LECTURE 7:** Heisenberg's uncertainty principle

**LECTURE 8:** Time-energy and angular momentum

**LECTURE 9:** position uncertainty, Uncertainty principle

**WEEK 4**

**LECTURE 10:** de-Broglie wave, (wave-particle duality).Gamma Ray Microscope

**LECTURE 11:** Electron diffraction from a slit

**LECTURE 12: TEST**

**WEEK 5**

**LECTURE13:** Derivation of time dependent Schrodinger wave equation

**LECTURE 14:** Derivation of time- independent Schrodinger wave equation

**LECTURE 15:** Discussion of Schrodinger wave equation

**WEEK 6**

**LECTURE 16:** Eigen values, Eigen functions, wave functions and its significance.

**LECTURE 17:** Normalization of wave function

**LECTURE 18:** concept of observable and operator

**WEEK 7**

**LECTURE 19:** Solution of Schrodinger equation

**LECTURE 20:** equation for harmonic oscillator excited states

**LECTURE 21:** equation for harmonic oscillator ground states

**WEEK 8**

**LECTURE 22:** Application of Schrodinger equation in the solution of the following one-dimensional problems

**LECTURE 23:** Schrodinger equation in the solution of the following 2-dimensional problems

**LECTURE 24:** Discussion ofSchrodinger equation in the solution of the following 2-dimensional problems

**WEEK 9**

**LECTURE 25:** Free particle in one dimensional box

**LECTURE 26:** Free particle in two dimensional box

**LECTURE 27:** Free particle in three dimensional box

**WEEK 10**

**LECTURE 28:** Problem class

**LECTURE 29:** solution of Schrödinger wave equation, Eigen function, Eigen values

**LECTURE 30:** solution of Schrödinger wave equation quantization of energy and momentum

**WEEK 11**

**LECTURE 31:** solution of Schrödinger wave equation nodes and antinodes, zero point energy

**LECTURE 32:** One-dimensional potential barrier E>V0 (Reflection and Transmission coefficient.

**LECTURE 33:** One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakagecoefficient,penetration depth).

**WEEK 12**

**LECTURE 34:** Revision

**LECTURE 35:** Test

**LECTURE 36:** Test

## References:

1. Quantum Mechanics by L.I.Schiff, McGraw Hill Book Company, Inc.
2. Quantum Mechanics by B. Crasem and J. D.Powel (Addison Wesley.
3. QuantumMechanics byA.P. Messiah

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: SOLID STATE PHYSICS SUBJECT CODE: PHY 501 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2021-2022 SECTION: - A**

**FACULTY: Dr. PRIYANKA DHAWAN, Mrs. INNU YADAV &Dr. ANU CHAUHAN**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Crystalline and glassy forms, liquid crystals
* **LECTURE 2:**Crystal structure, periodicity, lattice, and basis
* **LECTURE 3:**Crystal translational vectors

**WEEK 2**

* **LECTURE 4:**Crystal translational axes
* **LECTURE 5:**Unit cell and primitive cell
* **LECTURE 6:**Winger Seitz primitive Cell

**WEEK 3**

* **LECTURE 7:**Symmetry operations for a two-dimensional crystal
* **LECTURE 8:**Bravais lattices in two dimensions
* **LECTURE 9:**Bravais lattices in three dimensions

**WEEK 4**

* **LECTURE 10:TEST**
* **LECTURE 11:**Crystal planes
* **LECTURE 12:** Detail Information of Miller indices

**WEEK 5**

* **LECTURE 13:** Formation of Interplanar spacing
* **LECTURE 14:** Crystal structures of Zinc sulphide
* **LECTURE 15:** Crystal structures of Sodium Chloride

**WEEK 6**

* **LECTURE 16: :** Crystal structures of Diamonds.
* **LECTURE 17:** X-ray diffraction
* **LECTURE 18:** Bragg's Law

**WEEK 7**

* **LECTURE 19:** Experimental x-ray diffraction methods
* **LECTURE 20**: K-space
* **LECTURE 21: TEST**

**WEEK 8**

* **LECTURE 22:** Reciprocal lattice and its physical significance
* **LECTURE 23:** Reciprocal lattice vectors
* **LECTURE 24:** Reciprocal lattice to a simple cubic lattice

**WEEK 9**

* **LECTURE 25:** Reciprocal lattice to B C C
* **LECTURE 26:** Reciprocal lattice to F C C
* **LECTURE 27:** Relation between three lattices

**WEEK 10**

* **LECTURE 28:** Introduction to specific heat of solids
* **LECTURE 29:** Dulong and Pettit’s law of specific heat of solids and its drawbacks
* **LECTURE 30:** Einstein's theory of specific heat

**WEEK 11**

* **LECTURE 31:** Drawbacks of Einstein theory of specific heat
* **LECTURE 32:** Debye model of specific heat of solids.
* **LECTURE 33:** Comparison of three theories of specific heats of solids.

**WEEK 12**

* **LECTURE 34: Test**
* **LECTURE 35: Revision**
* **LECTURE 36: Test**

## References:

1. Introduction to solid state Physics (5th Ed.) by kittel, Wiley eastern Limited.

**Lesson Plan**

**Semester II ,**

**Paper I- PHY 201 :** Properties of Matter, Kinetic theory and Relativity

# Teacher Name : Dr. Parminder Singh

# Session: 2021-22

*Week 1*

**Lecture 1**: Unit-I : **:** Elasticity, Hooke’s law

**Lecture 2**: Elastic constants and their relations

**Lecture 3**: Poisson’s ratio, torsion of cylinder and twisting couple

*Week 2*

**Lecture 4**: ,Topic continued from Lecture 3

**Lecture 5** : Bending of beam (bending moment and its magnitude) cantilevers

**Lecture 6**: Centrally loaded beam.

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**:**: Unit-2 :** Assumptions of Kinetic Theory of gases, Law of equipartition of energy and its applications for specific heats of gases.

**Lecture 11** Topic continued.

**Lecture 12**: Maxwell distribution of speeds and velocities (derivation required).

*Week 5*

**Lecture 13:**Unit-1 (Internal Assessment- Test)

**Lecture 14:**Experimental verification of Maxwell’s Law of speed distribution

**Lecture 15 :**Most probable speed, Average and r.m.s. speed

*Week 6*

**Lecture 16:**Mean free path. Transport of energy and momentum,

**Lecture 17** Diffusion of gases. Brownian motion (qualitative)

**Lecture 18**. Real gases, Van der Waal’s equation.

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:**Student’s problems related to Unit-2

**Lecture 21:**Reference systems, inertial frames.

*Week 8*

**Lecture 22:Unit 3:** Galilean invariance and Conservation laws

**Lecture 23:** Newtonian relativity principle

**Lecture 24:** Michelson - Morley experiment: Search for ether.

*Week 9*

**Lecture 25:**. Unit-2 (InternalAssessment- Test)

**Lecture 26:**Topic continued from Lecture 24

**Lecture 27 :**Lorentz transformations

*Week 10*

**Lecture 28:** Length contraction.

**Lecture 29:** Time dilation.

**Lecture 30:** Velocity addition theorem, variation of mass with velocity and mass energy equivalence.

*Week 11*

**Lecture 31:**Topic continued.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (Vth Edition) by Mark W. Zemansky.
3. Berkeley Physics Course, Vol.-I Mechanics by E.M. Purchell.

**Lesson Plan**

# SemesterII, PaperII-PHY-202:ELECTROMAGNETIC

# INDUCTIONANDELECTRONICDEVICES

# Teacher Name: Mr.Chhatarpal

# Session: 2021-22

Week 1

**Lecture 1:**Growthanddecayofcurrentinacircuit with(a)Capacitanceand resistance (b)

resistance and inductance

**Lecture 2**: (c) Capacitance and inductance (d) Capacitanceresistanceandinductance.

**Lecture 3**: AC circuit analysis using complex variables with (a) capacitance and resistance,

Week 2

**Lecture 4**: (b) resistanceandinductance(c)capacitanceandinductance(d)capacitance,

inductance

**Lecture 5** : andresistanceSeriesandparallelresonantcircuit.

**Lecture 6**: Qualityfactor (Sharpnessof resonance).

Week 3

**Lecture 7**: Energybandsinsolids.

**Lecture 8**: Intrinsicandextrinsicsemiconductor,Halleffect,

**Lecture 9**: P-Njunctiondiode andtheirV-Icharacteristics.

Week 4

**Lecture 10**: Zenerandavalanchebreakdown. Resistance of a diode,

**Lecture 11**: Light Emitting diodes (LED). Photo conduction in semiconductors,photodiode,Solar Cell

**Lecture 12**: P-Njunctionhalfwaveandfullwaverectifier.

Week 5

**Lecture 13:** Typesoffiltercircuits(Land-withtheory).

**Lecture 14:**Zenerdiodeasvoltageregulator,simpleregulatedpowersupply.

**Lecture 15 :Transistors :** Junction Transistors, Bipolar transistors,

Week 6

**Lecture 16:** working of NPN and PNP transistors,

**Lecture 17:**Transistor connections(C-B, C-E, C-C mode

**Lecture 18:**), constants of transistor. Transistor characteristic curves (excluding h parameter analysis),

Week 7

**Lecture 19:** advantageof C-Bconfiguration.C.R. O.(Principle, constructionandworkingin detail).

**Lecture 20: Test**

**Lecture 21:** Transistor Amplifiers : Transistor biasing

Week 8

**Lecture 22:**, methods of Transistor biasing and stabilization. D.C.load line

**Lecture 23 :** . Common-base and common-emitter transistor biasing.

**Lecture 24 :** Common-base, common-emitteramplifiers.

Week 9

**Lecture 25:**. Classification of amplifiers.

**Lecture 26:**Resistance-capacitance (R-C) coupled amplifiertwostage

**Lecture 27 :**;conceptofbandwidth,noderivation).

Week 10

**Lecture 28:**. Feed-backinamplifiers,

.**Lecture 29:** advantageofnegativefeedbackEmitterfollower.

**Lecture 30:**Oscillators:Oscillators,PrincipleofOscillation,

Week 11

**Lecture 31:**ClassificationofOscillator.

**Lecture 32:** Conditionforself-sustained oscillation

**Lecture 33:**: Barkhousen Criterion for oscillations.

Week 12

**Lecture 34:** Tuned collector common emitteroscillator.Hartleyoscillator. Colpitt’s

oscillator

**Lecture 35: Doubt class & Numerical problems discussion**

**Lecture 36: Test**

# References:

1. ElectricityandMagnetismbyReitzandMilford(PrenticeHallofIndia)
2. ElectricityandMagnetismbyA.S.MahajanandA.A.Rangwala(TataMcGrawHill).
3. BasicElectronicsandLinearcircuitsbyN.N.Bhargava,D.C.KulshreshthaandS.C.Gupta(TITI, CHD).
4. SoildStateElectronicsbyJ.P.Agarwal,AmitAgarwal(PragatiPrakashan,Meerut).
5. ElectronicFundamentalsandApplicationsbyJ.D.Ryder(PrenticeHallIndia)

**LESSON PLAN**

**Semester IV, PAPER PH 401 : STATISTICAL MECHANICS**

**Teacher’s Name : Mrs POOJA**

**Session: 2021-22**

**WEEK 1**

**Lecture 1** : Unit-IIntroduction: Probability,someprobabilityconsiderations

**Lecture 2** : Combinationspossessingmaximum probability, combinations possessing

minimum probability

**Lecture 3** : Distribution ofmoleculesintwoboxes.

**WEEK 2**

**Lecture 4 :** Casewith weightage (general).

**Lecture 5** : Phase space,microstates and macrostates

**Lecture 6** : statistical fluctuations

**WEEK 3**

**Lecture 7 :** constraints and accessibleStates

**Lecture 8** : Thermodynamicalprobability

**Lecture 9** : Numerical of unit-II will be discussed

**WEEK 4**

**Lecture 10 :** Revision of unit-I

**Lecture 11** : Test of unit-I

**Lecture 12**: Postulates of Statistical Physics, Division of Phase space into cells

**WEEK 5**

**Lecture 13 :** Condition ofequilibrium between two system in thermal contact. b-Parameter

**Lecture 14** : Entropy andProbability

**Lecture 15** : Boltzmann’s distribution law. Evaluation of A and b

**WEEK 6**

**Lecture 16 :**  Bose-Einsteinstatistics

**Lecture 17** : ApplicationofB.E.StatisticstoPlanck’sradiationlaw

**Lecture 18** : B.E.gas.

**WEEK 7**

**Lecture 19 :** Numerical of unit 2

**Lecture 20** : Test of unit 2

**Lecture 21** : Fermi-Dirac statistics

**WEEK 8**

**Lecture 22 :** M.B. Law as limiting case of B.E. statistics

**Lecture 23** : Degeneracy

**Lecture 24** : B.E.Condensation

**WEEK 9**

**Lecture 25 :** Fermi- DiracGas

**Lecture 26** : Electrongasinmetals

**Lecture 27** : Zeropointenergy

**WEEK 10**

**Lecture 28 :** Specificheatofmetalsandits solution

**Lecture 29** : Numerical of unit 3

**Lecture 30** : Revision of unit-3

**WEEK 11**

**Lecture 31 :** Revision of unit-I

**Lecture 32** : Revision of unit-II

**Lecture 33** : Revision of unit-III

**WEEK 12**

**Lecture 34:** Quiz of unit I

**Lecture 35:** Quiz of unit II

**Lecture 36:** Quiz of unit III

**References:**

1. B.B.Laud,“IntroductiontoStatisticalMechanics”(Macmillan1981).
2. F.Reif,“StatisticalPhysics’(McGrawHill1988).
3. K.Huang,“StatisticalPhysics”(WileyEaster 1988).

**Lesson Plan**

**SemesterIV , PaperII-PHY 402: Optics-2**

# Teacher Name : Dr Monika Malik and Mr Vivek

# Session: 2021-22

Week 1

**Lecture 1**: Unit-I : Introduction

**Lecture 2**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film

**Lecture 3**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film(contd.)

Week 2

**Lecture 4**: Newton’srings

**Lecture 5** : Interferometers:Michelson’sinterferometerand

**Lecture 6**: itsapplicationto

(I) Standardization of a meter (II) determination of wave length

Week 3

**Lecture 7**:itsapplicationto

(I) Standardization of a meter (II) determination of wave length(contd.)

**Lecture 8**: Fresnel’sDiffraction (introduction)

**Lecture 9**: Fresnel’shalfperiodzones

Week 4

**Lecture 10**: zoneplate,diffractionatastraightedge

**Lecture 11**: rectangularslit and circular aperture.

**Lecture 12**: Unit test

Week 5

**Lecture 13:** Unit-2, Fraunhofer diffraction(introduction)

**Lecture 14:** One slit diffraction

**Lecture 15 :** Two slit diffraction

Week 6

**Lecture 16:** N-slit diffraction,

**Lecture 17:** Plane transmission granting spectrum

**Lecture 18:** Dispersive power of a grating

Week 7

**Lecture 19:**  Limit ofresolution

**Lecture 20:** Rayleigh’scriterion

**Lecture 21:** resolvingpoweroftelescopeandagrating

Week 8

**Lecture 22:**Revision and Doubt class

**Lecture 23:**Revision and Doubt class

**Lecture 24 :**test

Week 9

**Lecture 25:** Introduction to wave nature of light

**Lecture 26:** Polarisation and Double Refraction

**Lecture 27:** Polarisation by reflection

Week 10

**Lecture 28:** Polarisation by scattering

**Lecture 29:** Malus law, Phenomenon of double refraction

**Lecture 30:**Huygen’s wave theory of double refraction (Normal and oblique incidence)

Week 11

**Lecture 31:** Analysis of Palorised light : Nicol prism

**Lecture 32:** Quarter wave plate and half wave plate

**Lecture 33:** production and detection of (i) Plane polarized light (ii) Circularly polarized lightand (iii)Elliptically polarized light,

Week 12

**Lecture 34:** Optical activity, Fresnel’s theory of rotation

**Lecture 35:** Specificrotation,Polarimeters(halfshade and Bi-quartz).

**Lecture 36:** Test

# References:

1. OpticsbyAjayGhatak,TataMcGrawHill1977.
2. IntroductionofOpticsbyFrankL.PedrottiandLenoS.Pedrotti,PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: ATOMICMOLECULARANDLASERPHYSICS SUBJECT CODE: PHY 601 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2021-2022 SECTION: - A**

**FACULTY: Dr. PRIYANKA DHAWAN, Mrs. INNU YADAV &Dr. ANU CHAUHAN**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Vector atom model
* **LECTURE 2:**Quantum numbers associated with vector atom model
* **LECTURE 3:**Penetrating orbits (qualitiative description)

**WEEK 2**

* **LECTURE 4:**Non- penetrating orbits (qualitiative description)
* **LECTURE 5:**Spectral lines in different series of ailkali spectra
* **LECTURE 6:**Continue (Spectral lines in different series of ailkali spectra)

**WEEK 3**

* **LECTURE 7:**Spin orbit interactionand doublet term separation
* **LECTURE 8:**LS or Russel-Saunder Coupling (expressions for interaction energies)
* **LECTURE 9::**JJ Coupling (expressions for interaction energies)

**WEEK 4**

* **LECTURE 10:Test**
* **LECTURE 11:**Zeeman effect (normal and Anormalous)
* **LECTURE 12:** Zeeman pattern of D 1 and D2 lines of Na-atom

**WEEK 5**

* **LECTURE 13:** Paschen, Back effect of a single valence electron system
* **LECTURE 14:** Weak field Strak effect of Hydrogen atom
* **LECTURE 15:** Diseete set of electronic energies of molecules

**WEEK 6**

* **LECTURE 16:** Quantisation of Vibrational energies
* **LECTURE 17:** Quantisation of ratiationalenergies
* **LECTURE 18:** Raman effect (Quantitative description)

**WEEK 7**

* **LECTURE 19:** Stoke's lines
* **LECTURE 20**: Anti Stoke's lines
* **LECTURE 21: Test**

**WEEK 8**

* **LECTURE 22:** Main features of a laser : Directionality, high intensity
* **LECTURE 23:** High degree of coherence
* **LECTURE 24:** Spatial and temporal coherence

**WEEK 9**

* **LECTURE 25:** Einstein's coefficients
* **LECTURE 26:** Possibility of amplification
* **LECTURE 27:** Momentum transfer, life time of a level

**WEEK 10**

* **LECTURE 28:** Kinetics of optical obsorption
* **LECTURE 29:** Threshold condition for laser emission
* **LECTURE 30:** Laser pumping

**WEEK 11**

* **LECTURE 31:** He-Ne laser (Principle, Construction and Working).
* **LECTURE 32:** RUBY laser (Principle, Construction and Working).
* **LECTURE 33:** Applications of laser in the field of medicine and industry.

**WEEK 12**

* **LECTURE 34: Revision**
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Introduction to Atomic and Molecular Spectroscopy by V.K.Jain, Narosa (2007)
2. Introduction to Atomic Spectra by H.B. White.
3. Atomic spectra by G. Herzberg.
4. Molecular Spectra and Molecular Structure by G. Herzberg.
5. Fundamentals of molecular spectroscopy by Colin N. Banwell and Elaine M.Mc-Cash.
6. Lassers, Theory and Application (2nd Ed.) by Thagrajan and Ajay Ghatak.
7. Laser and Nonlinear Optics by B.B. Laud (2nd Ed.)
8. Introduction to Optics by Frank L. Pedrotti and Lens S. Pedrotti, Prentice Hall, 1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: NUCLEAR PHYSICS SUBJECT CODE: PHY 602 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2021-2022**

**FACULTY: Dr. PRIYANKA DHAWAN, Mrs. INNU YADAV &Dr. ANU CHAUHAN**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Nuclear mass and binding energy
* **LECTURE 2:**Systematics nuclear binding energy
* **LECTURE 3:**Nuclear stability

**WEEK 2**

* **LECTURE 4:**Detail discussion of Nuclear size
* **LECTURE 5:**Nuclear spin, parity
* **LECTURE 6:**Statistics magnetic dipole moment, quadrupole moment (shape concept)

**WEEK 3**

* **LECTURE 7:**Determination of mass by Bain-Bridge
* **LECTURE 8:**Bain-Bride and Jordan mass spectrograph
* **LECTURE 9:**Determination of charge by Mosley law

**WEEK 4**

* **LECTURE 10:**Determination of size of nuclei by Rutherford Back Scattering
* **LECTURE 11:Test**
* **LECTURE 12:** Interaction of heavy charged particles (Alpha particles)

**WEEK 5**

* **LECTURE 13:** Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula)
* **LECTURE 14:** Energetics of alpha-decay, Range and straggling of alphaparticles
* **LECTURE 15:** Geiger-Nuttal law

**WEEK 6**

* **LECTURE 16:** Introduction of Beta-particle, Origin of continuous beta-spectrum (neutrino hypothesis).
* **LECTURE 17:** Types of beta decay and energetics of beta decay
* **LECTURE 18:** Energy loss of beta- particles (ionization), Range of electrons, absorption of beta-particles

**WEEK 7**

* **LECTURE 19:** Interaction of Gamma Ray, Nature of gamma rays
* **LECTURE 20**: Energetics of gamma rays, passage of Gamma radiations through matter by photoelectric effect.
* **LECTURE 21:** Energetics of gamma rays, passage of Gamma radiations through matter by compton effect

**WEEK 8**

* **LECTURE 22:** Energetics of gamma rays, passage of Gamma radiations through matter by pair production effect
* **LECTURE 23:** Asborption of Gamma rays (Mass attenuation coefficient) and its application
* **LECTURE 24:** Nuclear reactions, Elastic scattering

**WEEK 9**

* **LECTURE 25:** Inelastic scatting, Nuclear disintegration
* **LECTURE 26:** Photoneuclear reaction, Radiative capture
* **LECTURE 27:** Direct reaction, heavy ion reactions and spallation Reactions

**WEEK 10**

* **LECTURE 28:** Conservation laws. Q-value and reaction threshold
* **LECTURE 29:** Nuclear Reactors General aspects of Reactor design
* **LECTURE 30:** Nuclear fission and fusion reactors (Principles, construction, working and use)

**WEEK 11**

* **LECTURE 31:** Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators
* **LECTURE 32:** Ionization chamber, proportional counter.
* **LECTURE 33:** G.M. counter detailed study.

**WEEK 12**

* **LECTURE 34:** Scintillation counter and semiconductor detector.
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Atomic and nuclear Physics, Vol. II by S.N. Ghashal.
2. Nuclear Physics by D.C. Tayal, Umesh Prakashan, 125, Goblind Dev Khurja (UP).
3. Concept of Modern physics by arther Besier, Tata McGraw Hill Publications.
4. Nuclear Physics by W.E. Burcham.
5. Nuclear Radiation Detectors by S.S. Kapoor
6. Experimental Nuclear Physics by M. Singru.

**Lesson Plan**

**Semester I , Paper I- PHY 101 : Mechanics**

# Teacher Name : Mr.Chattarpal

# Session: 2018-19

*Week 1*

**Lecture 1**: Unit-I : Mechanics of single and system of particles.

**Lecture 2**: Conservation of laws of linear momentum.

**Lecture 3**: Angular momentum and Mechanical energy.

*Week 2*

**Lecture 4**: ,Centre of mass and equation of motion

**Lecture 5** : Constrained motion

**Lecture 6**: Degrees of freedom

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**: Generalised coordinates, displacement, velocity

**Lecture 11** Generalised acceleration, momentum.

**Lecture 12**: Generalised force and potential.

*Week 5*

**Lecture 13:**Unit-1 (Internal Assesment- Test)

**Lecture 14:**Hamilton’s variational principle

**Lecture 15 :**Lagrange’s equation of motion from Hamilton’s Principle.

*Week 6*

**Lecture 16:**Linear Harmonic oscillator, simple pendulum,

**Lecture 17** Atwood’s machine.

**Lecture 18**. Numerical Problems from Unit-2

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:** Students problems related to Unit-2

**Lecture 21:**Rotation of Rigid body

*Week 8*

**Lecture 22:**Moment of inertia.

**Lecture 23:** Torque, angular momentum

**Lecture 24:** Kinetic energy of rotation.

*Week 9*

**Lecture 25:**. Unit-2 ( Internal Assesment- Test)

**Lecture 26:**Theorems of perpendicular and parallel axes with proof

**Lecture 27 :**Moment of inertia of solid sphere

*Week 10*

**Lecture 28:** Moment of inertia of Hollow sphere and Spherical shell.

**Lecture 29:** Moment of inertia ofsolid cylinder, hollow cylinder

**Lecture 30:** Moment of Inertia solid bar of rectangular cross-section.

*Week 11*

**Lecture 31:**Acceleration of a body rolling down on an inclined plane.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Classical Mechanics by V.K.Jain (Ane 2009)
2. Classical Mechanics by H. Goldstein (2nd Edition)
3. Berkeley Physics Course, Vol. I, Mechanics by E.M. Purchell

**Lesson Plan**

# PaperII-PHY102:ELECTRICITYANDMAGNETISM

# Teacher Name : Dr Kartar Singh/Dr Priyanka Dhawan

# Session: 2018-19

*Week 1*

**Lecture 1**: Unit-I : **Mathematical Background :** Scalars and Vectors, dot and cross product,

**Lecture 2:**Triple vectorproduct, Scalar and Vector fields,

**Lecture 3:** Differentiation of a vector, Gradient of a scalar and itsphysical significance,

*Week 2*

**Lecture 4:**Integration of a vector (line, surface and volume integral and theirphysicalsignificance),

**Lecture 5:**Gauss’s divergencetheorem

**Lecture 6:**andStockstheorem.

*Week 3*

**Lecture 7:Electrostatic Field :** Derivation of field E from potential as gradient,

**Lecture 8:**derivation ofLaplace and Poisson equations. Electric flux,

**Lecture 9:** Gauss’s Law and its application tospherical shell,

*Week 4*

**Lecture 10:** uniformly charged infinite plane and uniformity charged straight wire,mechanicalforceof chargedsurface,

**Lecture 11:**Energyperunitvolume.

**Lecture 12: Test**

*Week 4*

**Lecture 12:** Unit II: **Magnetostatistics :** Magnetic Induction, magetic flux,

**Lecture 13:** Unit solenoidal nature of Vector fieldof induction.

**Lecture 14:** PropertiesofB

*Week 5*

**Lecture 15:** Electronic theory of dia andpara magnetism (Langevin’s theory).

**Lecture 16:**Domain theory of ferromagnetism.

*Week 6*

**Lecture 17:** Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 18:** Contt.. Cycle ofMagnetisation - Hysteresis (Energy dissipation, Hysteresis loss and importance ofHysteresis curve).

**Lecture 19 :** Discussion on previous years question from unit II

*Week 7*

**Lecture 20:** Test

**Lecture 21:**UnitIII**Electromagnetic Theory : Introduction**

**Lecture 22:** Maxwell equation and their derivations,

*Week 8*

**Lecture 23:** Contt.. Maxwell equation and their derivations,

**Lecture 24:Contt..** Maxwell equation and their derivations,

**Lecture 25:Test**

*Week 9*

**Lecture 26:** DisplacementCurrent.

**Lecture 27:** Vectorandscalarpotentials,

**Lecture 28 :** Contt. Vectorandscalarpotentials,

*Week 10*

**Lecture 29:**boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 30 :** contt boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 31:** Contt. boundaryconditionsatinterfacebetweentwodifferentmedia,

*Week 11*

**Lecture 32: Contt** boundaryconditionsatinterfacebetweentwodifferentmedia,

**Lecture 33:** Propagationofelectromagneticwave(Basicidea,noderivation).

*Week 12*

**Lecture 34 :**PoyntingvectorandPoyntingtheorem.

**Lecture 35:** Revision

**Lecture 36:** Test

# References:

1. ElectricityandMagnetism byReitzandMilford(PrenticeHallofIndia)
2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill).

**Lesson Plan**

**SemesterIII , PaperI-PHY301:ComputerProgramming,Thermodynamics**

# Teacher Name : Mrs Innu Yadav/Dr Anu Chauhan

# Session: 2018-19

Week 1

**Lecture 1**: Unit-I : ComputerProgramming:Computerorganization,Binaryrepresentation

**Lecture 2**: Algorithm development,

**Lecture 3**: flowchartsand theirinterpretation.

Week 2

**Lecture 4**: Flowchart and algorithm-based problems

**Lecture 5** :Fortran Preliminaries: Integer and floating point arithmetic expression, **Lecture 6**: built infunctions executable and non-executable statements,input and outputstatements,

Week 3

**Lecture 7**: Formats,

**Lecture 8**: I.F.and GO TO statements,

**Lecture 9**: Do statement

Week 4

**Lecture 10**: Dimension, arrays statement

**Lecture 11**: Function andfunctionsubprogram.

**Lecture 12**: Test

Week 5

**Lecture 13:**Unit-II Thermodynamics-I:Secondlawofthermodynamics,

**Lecture 14:**Carnottheorem,Absolute scale of temperature,

**Lecture 15 :** test

Week 6

**Lecture 16:** Absolute Zero,

**Lecture 17:** Entropy, show that dQ/T=O, T-S diagramNernst heat law,

**Lecture 18:** Joule’s free expansion, Joule Thomson (Porous plug)experiment. Joule - Thomson effect.

Week 7

**Lecture 19:**  Liquefication of gases.

**Lecture 20:** Liquification of gases Contt.

**Lecture 21:** Test

Week 8

**Lecture 22:** Air pollution due to internalcombustionEngine.

**Lecture 23 :Unit III-**Thermodynamics-II : Derivation of Clausius – Claperyron Equation latent heat equation

**Lecture 24 :test**

Week 9

**Lecture 25:**. Phase diagram

**Lecture 26:** triple point of a substance.

**Lecture 27 :** test

Week 10

**Lecture 28:** Development of Maxwellthermodynamicalrelations.

**Lecture 29: contt.**Development of Maxwellthermodynamicalrelations.

**Lecture 30:**ApplicationofMaxwellrelationsinthederivationof relationsbetweenentropy,specificheatsandthermodynamicvariables.

Week 11

**Lecture 31:** Test

**Lecture 32:** Thermodynamic functions : Internal energy (U), Helmholtz function (F),

**Lecture 33** Enthalpy(H),Gibbsfunction(G)andthe relations betweenthem.

Week 12

**Lecture 34: Test**

**Lecture 35: Revision lecture**

**Lecture 36: Test**

# References:

1. Rajaraman,FortranProgramming.
2. SchaumSeries,Fortran77.
3. RamKumar,ProgrammingwithFortran-77.
4. S.LokanathanandR.S.,Gambir,StatisticalandThermalPhysics(AnIntroduction),PrenticeHallofIndia,Pvt.,Ltd.(1991,NewDelhi).
5. J.K.SharmaandK.K.Sarkar,ThermodynamicsandstatisticalPhysics,Himalaya PublishingHouse(1991,Bombay.)
6. M.W.ZemanskyandR.Dittman,HeatandThermodynamics,McGrawHill,NewYork (1981).

# Lesson plan Paper-IIPHY302

**Optics–I**

# Teacher Name : Dr Parminder/Dr Anu Chauhan

# Session: 2018-19

Week 1

**Lecture 1:** Unit-I: Fourier Analysis and Fourier Transforms : Speed of transverse waves on auniform string.

**Lecture 2:** Speed of longitudinal waves in a fluid

**Lecture 3:** superposition of waves(physical idea)

Week 2

**Lecture 4:**  Fourier Analysis of complex waves

**Lecture 5:** Fourier Analysis application for thesolution of triangular

**Lecture 6:** : Fourier Analysis rectangular waves,

Week 3

**Lecture 7: Application of Fourier analysis to** half wave rectifier output

**Lecture 8** : **Application of Fourier analysis to** full wave rectifier out puts.

**Lecture 9**: Test

Week 4

**Lecture 10:**Fouriertransformsanditsproperties.

**Lecture 11:** Applicationoffouriertransformtofollowing function.

(I)

f(x) =

e-x2/2

**Lecture 12:** Applicationoffouriertransformtofollowing function.

f(x) = I[x]<a

0[x]>a

Week 5

**Lecture 13: Unit II Geometrical optics : Introduction to** GeometricalOptics:

**Lecture 14:** Matrixmethodsinparaxialoptics,

**Lecture 15:** effectsoftranslationand refraction,

Week 6

**Lecture 16:** Test

**Lecture 17 :**derivation of thin lens and thick lens formulae using matrix method,

**Lecture 18:** unit plane, nodalplanes, system of thin lenses,

Week 7

**Lecture 19:** Chromatic,

**Lecture 20:** spherical

**Lecture 21:** coma,

Week 8

**Lecture 22:** astigmatism and

**Lecture 23:**distortionaberrationsand theirremedies.

**Lecture 24:** Test

Week 9

**Lecture 25:** Unit Interference : Introduction to Interference

**Lecture 26:** Interference by Division of Wavefront : Young’s Double slit Experiment

**Lecture 27:** Fringe width in Young’s Double slit experiment

Week 10

**Lecture 28:** Interference of white light vs monochromatic light and law of conservation of energy in interference

**Lecture 29 :** Fresnel’s Biprism

**Lecture 30:** Applications of Fresnel’s Biprism in determinationofwavelengthofsodiumlight

Week 11

**Lecture 31:**Application of Frenel’s Bi-prism in determination of thicknessofmica sheet,

**Lecture 32:**Lioyd’smirror,

**Lecture 33:** phase change on reflection.

Week 12

**Lecture 34:** Difference Between interference by Liyod mirror and Frsenel’s Bi-prism

**Lecture 35:** Revision

**Lecture 36:** Test

# References

1. MathematicalPhysicsbyB.S.RajputandYogPrakashPragatiPrakashan.
2. TheoryandProblemsofLaplaceTransformsbyMurrariR.spiegel,McGrawHillBook Company.
3. OpticsbyAjayGhatak,TataMcGrawHill1977.
4. Introduction of Optics by Frank L. Pedrotti and Leno S. Pedrotti, PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: QUANTUM MECHANICS SUBJECT CODE: PHY 502 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2018-2019**

**FACULTY: Mrs Pooja**

**WEEK 1**

**LECTURE 1: UNIT-1:** Failure of (Classical) E.M. Theory, quantum theory of radiation (old quantum theory)

**LECTURE 2:** Photon, photoelectric effect and Einstein’s photoelectric equation

**LECTURE 3:** Compton Effect (theory and result)

**WEEK 2**

**LECTURE 4:** Inadequancy of old quantum theory, de-Broglie hypothesis

**LECTURE 5:** Davisson and Germer experiment, G.P. Thomson experiment

**LECTURE 6:** Phase velocity group velocity

**WEEK 3**

**LECTURE 7:** Heisenberg's uncertainty principle

**LECTURE 8:** Time-energy and angular momentum

**LECTURE 9:** position uncertainty, Uncertainty principle

**WEEK 4**

**LECTURE 10:** de-Broglie wave, (wave-particle duality).Gamma Ray Microscope

**LECTURE 11:** Electron diffraction from a slit

**LECTURE 12: TEST**

**WEEK 5**

**LECTURE13:** Derivation of time dependent Schrodinger wave equation

**LECTURE 14:** Derivation of time- independent Schrodinger wave equation

**LECTURE 15:** Discussion of Schrodinger wave equation

**WEEK 6**

**LECTURE 16:** Eigen values, Eigen functions, wave functions and its significance.

**LECTURE 17:** Normalization of wave function

**LECTURE 18:** concept of observable and operator

**WEEK 7**

**LECTURE 19:** Solution of Schrodinger equation

**LECTURE 20:** equation for harmonic oscillator excited states

**LECTURE 21:** equation for harmonic oscillator ground states

**WEEK 8**

**LECTURE 22:** Application of Schrodinger equation in the solution of the following one-dimensional problems

**LECTURE 23:** Schrodinger equation in the solution of the following 2-dimensional problems

**LECTURE 24:** Discussion ofSchrodinger equation in the solution of the following 2-dimensional problems

**WEEK 9**

**LECTURE 25:** Free particle in one dimensional box

**LECTURE 26:** Free particle in two dimensional box

**LECTURE 27:** Free particle in three dimensional box

**WEEK 10**

**LECTURE 28:** Problem class

**LECTURE 29:** solution of Schrödinger wave equation, Eigen function, Eigen values

**LECTURE 30:** solution of Schrödinger wave equation quantization of energy and momentum

**WEEK 11**

**LECTURE 31:** solution of Schrödinger wave equation nodes and antinodes, zero point energy

**LECTURE 32:** One-dimensional potential barrier E>V0 (Reflection and Transmission coefficient.

**LECTURE 33:** One-dimensional potential barrier, E>V0 (Reflection Coefficient, penetration of leakagecoefficient,penetration depth).

**WEEK 12**

**LECTURE 34:** Revision

**LECTURE 35:** Test

**LECTURE 36:** Test

## References:

1. Quantum Mechanics by L.I.Schiff, McGraw Hill Book Company, Inc.
2. Quantum Mechanics by B. Crasem and J. D.Powel (Addison Wesley.
3. QuantumMechanics byA.P. Messiah

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: SOLID STATE PHYSICS SUBJECT CODE: PHY 501 SEMESTER: V**

**CLASS: B.Sc 3RD year**

**SESSION: 2018-2019 SECTION: - A**

**FACULTY: Mr Vivek**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Crystalline and glassy forms, liquid crystals
* **LECTURE 2:**Crystal structure, periodicity, lattice, and basis
* **LECTURE 3:**Crystal translational vectors

**WEEK 2**

* **LECTURE 4:**Crystal translational axes
* **LECTURE 5:**Unit cell and primitive cell
* **LECTURE 6:**Winger Seitz primitive Cell

**WEEK 3**

* **LECTURE 7:**Symmetry operations for a two-dimensional crystal
* **LECTURE 8:**Bravais lattices in two dimensions
* **LECTURE 9:**Bravais lattices in three dimensions

**WEEK 4**

* **LECTURE 10:TEST**
* **LECTURE 11:**Crystal planes
* **LECTURE 12:** Detail Information of Miller indices

**WEEK 5**

* **LECTURE 13:** Formation of Interplanar spacing
* **LECTURE 14:** Crystal structures of Zinc sulphide
* **LECTURE 15:** Crystal structures of Sodium Chloride

**WEEK 6**

* **LECTURE 16: :** Crystal structures of Diamonds.
* **LECTURE 17:** X-ray diffraction
* **LECTURE 18:** Bragg's Law

**WEEK 7**

* **LECTURE 19:** Experimental x-ray diffraction methods
* **LECTURE 20**: K-space
* **LECTURE 21: TEST**

**WEEK 8**

* **LECTURE 22:** Reciprocal lattice and its physical significance
* **LECTURE 23:** Reciprocal lattice vectors
* **LECTURE 24:** Reciprocal lattice to a simple cubic lattice

**WEEK 9**

* **LECTURE 25:** Reciprocal lattice to B C C
* **LECTURE 26:** Reciprocal lattice to F C C
* **LECTURE 27:** Relation between three lattices

**WEEK 10**

* **LECTURE 28:** Introduction to specific heat of solids
* **LECTURE 29:** Dulong and Pettit’s law of specific heat of solids and its drawbacks
* **LECTURE 30:** Einstein's theory of specific heat

**WEEK 11**

* **LECTURE 31:** Drawbacks of Einstein theory of specific heat
* **LECTURE 32:** Debye model of specific heat of solids.
* **LECTURE 33:** Comparison of three theories of specific heats of solids.

**WEEK 12**

* **LECTURE 34: Test**
* **LECTURE 35: Revision**
* **LECTURE 36: Test**

## References:

1. Introduction to solid state Physics (5th Ed.) by kittel, Wiley eastern Limited.

**Lesson Plan**

**Semester II ,**

**Paper I- PHY 201 :** Properties of Matter, Kinetic theory and Relativity

# Teacher Name : Dr Kartar Singh/Dr Priyanka dhawan

# Session: 2018-19

*Week 1*

**Lecture 1**: Unit-I : **:** Elasticity, Hooke’s law

**Lecture 2**: Elastic constants and their relations

**Lecture 3**: Poisson’s ratio, torsion of cylinder and twisting couple

*Week 2*

**Lecture 4**: ,Topic continued from Lecture 3

**Lecture 5** : Bending of beam (bending moment and its magnitude) cantilevers

**Lecture 6**: Centrally loaded beam.

*Week 3*

**Lecture 7**: Numerical Problems related to Unit 1

**Lecture 8**: Numerical Problems related to Unit 1

**Lecture 9**: Students Problems related to Unit 1

*Week 4*

**Lecture 10**:**: Unit-2 :** Assumptions of Kinetic Theory of gases, Law of equipartition of energy and its applications for specific heats of gases.

**Lecture 11** Topic continued.

**Lecture 12**: Maxwell distribution of speeds and velocities (derivation required).

*Week 5*

**Lecture 13:**Unit-1 (Internal Assessment- Test)

**Lecture 14:**Experimental verification of Maxwell’s Law of speed distribution

**Lecture 15 :**Most probable speed, Average and r.m.s. speed

*Week 6*

**Lecture 16:**Mean free path. Transport of energy and momentum,

**Lecture 17** Diffusion of gases. Brownian motion (qualitative)

**Lecture 18**. Real gases, Van der Waal’s equation.

*Week 7*

**Lecture 19**. Numerical Problems from Unit -2

**Lecture 20:**Student’s problems related to Unit-2

**Lecture 21:**Reference systems, inertial frames.

*Week 8*

**Lecture 22:Unit 3:** Galilean invariance and Conservation laws

**Lecture 23:** Newtonian relativity principle

**Lecture 24:** Michelson - Morley experiment: Search for ether.

*Week 9*

**Lecture 25:**. Unit-2 (InternalAssessment- Test)

**Lecture 26:**Topic continued from Lecture 24

**Lecture 27 :**Lorentz transformations

*Week 10*

**Lecture 28:** Length contraction.

**Lecture 29:** Time dilation.

**Lecture 30:** Velocity addition theorem, variation of mass with velocity and mass energy equivalence.

*Week 11*

**Lecture 31:**Topic continued.

**Lecture 32:** Numerical Problem Unit-3

**Lecture 33:** Numerical Problem Unit-3

*Week 12*

**Lecture 34: Students doubts from Unit-1,2,3.**

**Lecture 35: Students doubts from Unit-1,2,3.**

**Lecture 36: Unit-1,2,3 (Final Assesment- Test)**

# References

1. Properties of Matter by D.S. Mathur.
2. Heat and Thermodynamics (Vth Edition) by Mark W. Zemansky.
3. Berkeley Physics Course, Vol.-I Mechanics by E.M. Purchell.

**Lesson Plan**

# SemesterII, PaperII-PHY-202:ELECTROMAGNETIC

# INDUCTIONANDELECTRONICDEVICES

# Teacher Name: Mr.Chhatarpal/Dr Priyanka Dhawan

# Session: 2018-19

Week 1

**Lecture 1:**Growthanddecayofcurrentinacircuit with(a)Capacitanceand resistance (b)

resistance and inductance

**Lecture 2**: (c) Capacitance and inductance (d) Capacitanceresistanceandinductance.

**Lecture 3**: AC circuit analysis using complex variables with (a) capacitance and resistance,

Week 2

**Lecture 4**: (b) resistanceandinductance(c)capacitanceandinductance(d)capacitance,

inductance

**Lecture 5** : andresistanceSeriesandparallelresonantcircuit.

**Lecture 6**: Qualityfactor (Sharpnessof resonance).

Week 3

**Lecture 7**: Energybandsinsolids.

**Lecture 8**: Intrinsicandextrinsicsemiconductor,Halleffect,

**Lecture 9**: P-Njunctiondiode andtheirV-Icharacteristics.

Week 4

**Lecture 10**: Zenerandavalanchebreakdown. Resistance of a diode,

**Lecture 11**: Light Emitting diodes (LED). Photo conduction in semiconductors,photodiode,Solar Cell

**Lecture 12**: P-Njunctionhalfwaveandfullwaverectifier.

Week 5

**Lecture 13:** Typesoffiltercircuits(Land-withtheory).

**Lecture 14:**Zenerdiodeasvoltageregulator,simpleregulatedpowersupply.

**Lecture 15 :Transistors :** Junction Transistors, Bipolar transistors,

Week 6

**Lecture 16:** working of NPN and PNP transistors,

**Lecture 17:**Transistor connections(C-B, C-E, C-C mode

**Lecture 18:**), constants of transistor. Transistor characteristic curves (excluding h parameter analysis),

Week 7

**Lecture 19:** advantageof C-Bconfiguration.C.R. O.(Principle, constructionandworkingin detail).

**Lecture 20: Test**

**Lecture 21:** Transistor Amplifiers : Transistor biasing

Week 8

**Lecture 22:**, methods of Transistor biasing and stabilization. D.C.load line

**Lecture 23 :** . Common-base and common-emitter transistor biasing.

**Lecture 24 :** Common-base, common-emitteramplifiers.

Week 9

**Lecture 25:**. Classification of amplifiers.

**Lecture 26:**Resistance-capacitance (R-C) coupled amplifiertwostage

**Lecture 27 :**;conceptofbandwidth,noderivation).

Week 10

**Lecture 28:**. Feed-backinamplifiers,

.**Lecture 29:** advantageofnegativefeedbackEmitterfollower.

**Lecture 30:**Oscillators:Oscillators,PrincipleofOscillation,

Week 11

**Lecture 31:**ClassificationofOscillator.

**Lecture 32:** Conditionforself-sustained oscillation

**Lecture 33:**: Barkhousen Criterion for oscillations.

Week 12

**Lecture 34:** Tuned collector common emitteroscillator.Hartleyoscillator. Colpitt’s

oscillator

**Lecture 35: Doubt class & Numerical problems discussion**

**Lecture 36: Test**

# References:

1. ElectricityandMagnetismbyReitzandMilford(PrenticeHallofIndia)
2. ElectricityandMagnetismbyA.S.MahajanandA.A.Rangwala(TataMcGrawHill).
3. BasicElectronicsandLinearcircuitsbyN.N.Bhargava,D.C.KulshreshthaandS.C.Gupta(TITI, CHD).
4. SoildStateElectronicsbyJ.P.Agarwal,AmitAgarwal(PragatiPrakashan,Meerut).
5. ElectronicFundamentalsandApplicationsbyJ.D.Ryder(PrenticeHallIndia)

**LESSON PLAN**

**Semester IV, PAPER PH 401 : STATISTICAL MECHANICS**

**Teacher’s Name :Dr Anu Chauhan/Mrs Innu Yadav**

**Session: 2018-19**

**WEEK 1**

**Lecture 1** : Unit-IIntroduction: Probability,someprobabilityconsiderations

**Lecture 2** : Combinationspossessingmaximum probability, combinations possessing

minimum probability

**Lecture 3** : Distribution ofmoleculesintwoboxes.

**WEEK 2**

**Lecture 4 :** Casewith weightage (general).

**Lecture 5** : Phase space,microstates and macrostates

**Lecture 6** : statistical fluctuations

**WEEK 3**

**Lecture 7 :** constraints and accessibleStates

**Lecture 8** : Thermodynamicalprobability

**Lecture 9** : Numerical of unit-II will be discussed

**WEEK 4**

**Lecture 10 :** Revision of unit-I

**Lecture 11** : Test of unit-I

**Lecture 12**: Postulates of Statistical Physics, Division of Phase space into cells

**WEEK 5**

**Lecture 13 :** Condition ofequilibrium between two system in thermal contact. b-Parameter

**Lecture 14** : Entropy andProbability

**Lecture 15** : Boltzmann’s distribution law. Evaluation of A and b

**WEEK 6**

**Lecture 16 :**  Bose-Einsteinstatistics

**Lecture 17** : ApplicationofB.E.StatisticstoPlanck’sradiationlaw

**Lecture 18** : B.E.gas.

**WEEK 7**

**Lecture 19 :** Numerical of unit 2

**Lecture 20** : Test of unit 2

**Lecture 21** : Fermi-Dirac statistics

**WEEK 8**

**Lecture 22 :** M.B. Law as limiting case of B.E. statistics

**Lecture 23** : Degeneracy

**Lecture 24** : B.E.Condensation

**WEEK 9**

**Lecture 25 :** Fermi- DiracGas

**Lecture 26** : Electrongasinmetals

**Lecture 27** : Zeropointenergy

**WEEK 10**

**Lecture 28 :** Specificheatofmetalsandits solution

**Lecture 29** : Numerical of unit 3

**Lecture 30** : Revision of unit-3

**WEEK 11**

**Lecture 31 :** Revision of unit-I

**Lecture 32** : Revision of unit-II

**Lecture 33** : Revision of unit-III

**WEEK 12**

**Lecture 34:** Quiz of unit I

**Lecture 35:** Quiz of unit II

**Lecture 36:** Quiz of unit III

**References:**

1. B.B.Laud,“IntroductiontoStatisticalMechanics”(Macmillan1981).
2. F.Reif,“StatisticalPhysics’(McGrawHill1988).
3. K.Huang,“StatisticalPhysics”(WileyEaster 1988).

**Lesson Plan**

**SemesterIV , PaperII-PHY 402: Optics-2**

# Teacher Name : Dr Parminder/Dr Anu Chauhan

# Session: 2018-19

Week 1

**Lecture 1**: Unit-I : Introduction

**Lecture 2**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film

**Lecture 3**: Interference by Division of Amplitude :Color of thin, films, wedge shaped film(contd.)

Week 2

**Lecture 4**: Newton’srings

**Lecture 5** : Interferometers:Michelson’sinterferometerand

**Lecture 6**: itsapplicationto

(I) Standardization of a meter (II) determination of wave length

Week 3

**Lecture 7**:itsapplicationto

(I) Standardization of a meter (II) determination of wave length(contd.)

**Lecture 8**: Fresnel’sDiffraction (introduction)

**Lecture 9**: Fresnel’shalfperiodzones

Week 4

**Lecture 10**: zoneplate,diffractionatastraightedge

**Lecture 11**: rectangularslit and circular aperture.

**Lecture 12**: Unit test

Week 5

**Lecture 13:** Unit-2, Fraunhofer diffraction(introduction)

**Lecture 14:** One slit diffraction

**Lecture 15 :** Two slit diffraction

Week 6

**Lecture 16:** N-slit diffraction,

**Lecture 17:** Plane transmission granting spectrum

**Lecture 18:** Dispersive power of a grating

Week 7

**Lecture 19:**  Limit ofresolution

**Lecture 20:** Rayleigh’scriterion

**Lecture 21:** resolvingpoweroftelescopeandagrating

Week 8

**Lecture 22:**Revision and Doubt class

**Lecture 23:**Revision and Doubt class

**Lecture 24 :**test

Week 9

**Lecture 25:** Introduction to wave nature of light

**Lecture 26:** Polarisation and Double Refraction

**Lecture 27:** Polarisation by reflection

Week 10

**Lecture 28:** Polarisation by scattering

**Lecture 29:** Malus law, Phenomenon of double refraction

**Lecture 30:**Huygen’s wave theory of double refraction (Normal and oblique incidence)

Week 11

**Lecture 31:** Analysis of Palorised light : Nicol prism

**Lecture 32:** Quarter wave plate and half wave plate

**Lecture 33:** production and detection of (i) Plane polarized light (ii) Circularly polarized lightand (iii)Elliptically polarized light,

Week 12

**Lecture 34:** Optical activity, Fresnel’s theory of rotation

**Lecture 35:** Specificrotation,Polarimeters(halfshade and Bi-quartz).

**Lecture 36:** Test

# References:

1. OpticsbyAjayGhatak,TataMcGrawHill1977.
2. IntroductionofOpticsbyFrankL.PedrottiandLenoS.Pedrotti,PrenticeHall1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: ATOMICMOLECULARANDLASERPHYSICS SUBJECT CODE: PHY 601 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2018-2019 SECTION: - A**

**FACULTY: Mr Vivek**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Vector atom model
* **LECTURE 2:**Quantum numbers associated with vector atom model
* **LECTURE 3:**Penetrating orbits (qualitiative description)

**WEEK 2**

* **LECTURE 4:**Non- penetrating orbits (qualitiative description)
* **LECTURE 5:**Spectral lines in different series of ailkali spectra
* **LECTURE 6:**Continue (Spectral lines in different series of ailkali spectra)

**WEEK 3**

* **LECTURE 7:**Spin orbit interactionand doublet term separation
* **LECTURE 8:**LS or Russel-Saunder Coupling (expressions for interaction energies)
* **LECTURE 9::**JJ Coupling (expressions for interaction energies)

**WEEK 4**

* **LECTURE 10:Test**
* **LECTURE 11:**Zeeman effect (normal and Anormalous)
* **LECTURE 12:** Zeeman pattern of D 1 and D2 lines of Na-atom

**WEEK 5**

* **LECTURE 13:** Paschen, Back effect of a single valence electron system
* **LECTURE 14:** Weak field Strak effect of Hydrogen atom
* **LECTURE 15:** Diseete set of electronic energies of molecules

**WEEK 6**

* **LECTURE 16:** Quantisation of Vibrational energies
* **LECTURE 17:** Quantisation of ratiationalenergies
* **LECTURE 18:** Raman effect (Quantitative description)

**WEEK 7**

* **LECTURE 19:** Stoke's lines
* **LECTURE 20**: Anti Stoke's lines
* **LECTURE 21: Test**

**WEEK 8**

* **LECTURE 22:** Main features of a laser : Directionality, high intensity
* **LECTURE 23:** High degree of coherence
* **LECTURE 24:** Spatial and temporal coherence

**WEEK 9**

* **LECTURE 25:** Einstein's coefficients
* **LECTURE 26:** Possibility of amplification
* **LECTURE 27:** Momentum transfer, life time of a level

**WEEK 10**

* **LECTURE 28:** Kinetics of optical obsorption
* **LECTURE 29:** Threshold condition for laser emission
* **LECTURE 30:** Laser pumping

**WEEK 11**

* **LECTURE 31:** He-Ne laser (Principle, Construction and Working).
* **LECTURE 32:** RUBY laser (Principle, Construction and Working).
* **LECTURE 33:** Applications of laser in the field of medicine and industry.

**WEEK 12**

* **LECTURE 34: Revision**
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

1. Introduction to Atomic and Molecular Spectroscopy by V.K.Jain, Narosa (2007)
2. Introduction to Atomic Spectra by H.B. White.
3. Atomic spectra by G. Herzberg.
4. Molecular Spectra and Molecular Structure by G. Herzberg.
5. Fundamentals of molecular spectroscopy by Colin N. Banwell and Elaine M.Mc-Cash.
6. Lassers, Theory and Application (2nd Ed.) by Thagrajan and Ajay Ghatak.
7. Laser and Nonlinear Optics by B.B. Laud (2nd Ed.)
8. Introduction to Optics by Frank L. Pedrotti and Lens S. Pedrotti, Prentice Hall, 1987.

**LESSON PLAN**

**DRONACHARYA GOVT. COLLEGE, GURUGRAM**

**DEPARTMENT OF PHYSICS**

**SUBJECT: NUCLEAR PHYSICS SUBJECT CODE: PHY 602 SEMESTER: VI**

**CLASS: B.Sc 3RD year**

**SESSION: 2018-2019**

**FACULTY: Mrs Pooja**

**WEEK 1**

* **LECTURE 1: UNIT-1:** Nuclear mass and binding energy
* **LECTURE 2:**Systematics nuclear binding energy
* **LECTURE 3:**Nuclear stability

**WEEK 2**

* **LECTURE 4:**Detail discussion of Nuclear size
* **LECTURE 5:**Nuclear spin, parity
* **LECTURE 6:**Statistics magnetic dipole moment, quadrupole moment (shape concept)

**WEEK 3**

* **LECTURE 7:**Determination of mass by Bain-Bridge
* **LECTURE 8:**Bain-Bride and Jordan mass spectrograph
* **LECTURE 9:**Determination of charge by Mosley law

**WEEK 4**

* **LECTURE 10:**Determination of size of nuclei by Rutherford Back Scattering
* **LECTURE 11:Test**
* **LECTURE 12:** Interaction of heavy charged particles (Alpha particles)

**WEEK 5**

* **LECTURE 13:** Alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula)
* **LECTURE 14:** Energetics of alpha-decay, Range and straggling of alphaparticles
* **LECTURE 15:** Geiger-Nuttal law

**WEEK 6**

* **LECTURE 16:** Introduction of Beta-particle, Origin of continuous beta-spectrum (neutrino hypothesis).
* **LECTURE 17:** Types of beta decay and energetics of beta decay
* **LECTURE 18:** Energy loss of beta- particles (ionization), Range of electrons, absorption of beta-particles

**WEEK 7**

* **LECTURE 19:** Interaction of Gamma Ray, Nature of gamma rays
* **LECTURE 20**: Energetics of gamma rays, passage of Gamma radiations through matter by photoelectric effect.
* **LECTURE 21:** Energetics of gamma rays, passage of Gamma radiations through matter by compton effect

**WEEK 8**

* **LECTURE 22:** Energetics of gamma rays, passage of Gamma radiations through matter by pair production effect
* **LECTURE 23:** Asborption of Gamma rays (Mass attenuation coefficient) and its application
* **LECTURE 24:** Nuclear reactions, Elastic scattering

**WEEK 9**

* **LECTURE 25:** Inelastic scatting, Nuclear disintegration
* **LECTURE 26:** Photoneuclear reaction, Radiative capture
* **LECTURE 27:** Direct reaction, heavy ion reactions and spallation Reactions

**WEEK 10**

* **LECTURE 28:** Conservation laws. Q-value and reaction threshold
* **LECTURE 29:** Nuclear Reactors General aspects of Reactor design
* **LECTURE 30:** Nuclear fission and fusion reactors (Principles, construction, working and use)

**WEEK 11**

* **LECTURE 31:** Linear accelerator, Tendem accelerator, Cyclotron and Betatron accelerators
* **LECTURE 32:** Ionization chamber, proportional counter.
* **LECTURE 33:** G.M. counter detailed study.

**WEEK 12**

* **LECTURE 34:** Scintillation counter and semiconductor detector.
* **LECTURE 35: Doubt clearing session**
* **LECTURE 36: Test**

## References:

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3. Concept of Modern physics by arther Besier, Tata McGraw Hill Publications.
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5. Nuclear Radiation Detectors by S.S. Kapoor
6. Experimental Nuclear Physics by M. Singru.