ACADEMIC PLANNER & UNITIZATION OF SYLLABUS
ACADEMIC YEAR 2022-23.
DEPARTMENT : Physics NEP CLASS : III Sem
Paper II -Phy-DSCT 2:
Electricity and Magnetism

Week/Month	CLASS	Portions Planned for 1 hour	Teacher
May 1st week	1	**Electric charge and field:** Coulomb's law, electric field strength	KCR
	2	**Conductors in electrostatic field:** Conductors and insulators, conductors in electric field.	PA
	3	**Magnetism** Definition of magnetic field, Ampere's law	KCR
	4	**Electromagnetic waves:**Equation of continuity, Maxwell's equations	KSS
May 2nd week	1	Electric field lines, point charge in an electric field and electric dipole,	KCR
	2	Capacitance and capacitors,. expression for capacitance in a parallel plate capacitor,.	PA
	3	Biot-savart law(magnetic force and magnetic flux),magnetic force on a current carrying conductor,,	KCR
	4	Maxwell's equations, displacement current	KSS
May 3rd week	1	work done by a charge (derivation of the expression for potential energy) and problems	KCR
	2	parallel plate capacitor with dielectric,	PA
	3	Lorentz force, Hall effect in a conductor. Electromagnetic induction, Faraday's laws of induction	KCR
	4	Equation for propagation of electro magnetic wave,.	KSS
May 4th week	1	**Gauss law:** Gauss's law and its	KCR
	2	Dielectrics: an atomic view Energy stored in a capacitor,	PA
	3	Lenz's law, expression for self inductance and energy stored in a magnetic field AC Circuits RMS and Average value of AC , Response of RL,RC and RLC circuits using j operator method, quality factor admittance and impedance power and energy in AC circuits	KCR
	4	transverse nature of electro magnetic wave, energy transported by electromagnetic wave	KSS
May 5thand	1	applications - electric fields of a (i) spherical charge	KCR

June 1st week		distribution, (ii) line charge and(iii) an infinite flat sheet of charge and problems	
	2	Dielectric and Gauss's law and problems	PA
	3	Mutual inductance .conducting rod in a magnetic field Problems	KCR
	4	Problems	KSS
June 2nd week	1	**Electrostatic potential** Electric potential, line integral, gradient of a scalar function, relation between field and potential	KCR
	2	**DC currents:** Electric currents and current density.	PA
	3	AC Circuits RMS and Average value of AC	KCR
	4	Poynting vector, magnetic moment of a point charge moving in a circular loop	KSS
June 3rd week	1	Potential due to point charge and distribution of charges (Examples: potential associated with a spherical charge distribution, infinite line charge distribution, infinite plane sheet of charges).	KCR
	2	Electrical conductivity and Ohm's law (Review). Network theorems (Thevenin's theorem	PA
	3	Response of RL circuit using j operator method	KCR
	4	electric current in atoms, electron spin and magnetic moment	KSS
June 4th week	1	Test	KCR
	2	Test	PA
	3	Test	KCR
	4	Test	KSS
June 5th and July 1st week	1	Constant potential surfaces, Potential due to a dipole and electric quadrupole and problems.	KCR
	2	Superposition theorem and the maximum power transfer theorem),	PA
	3	Response of RC circuit using j operator	KCR
	4	**Magnetic materials**: magnetic intensity and magnetic induction, intensity of magnetisation, susceptibility, permeability,	KSS
July 2nd week	1	Superposition- (2) different frequencies (Beats) – Analytical treatment. Beats	KCR
	2	maximum power transfer theorem), Problems	PA
	3	Response of RLC circuit using j operator	KCR
	4	Types of magnetic materials, diamagnetic paramagnetic and ferromagnetic materials.	KSS
July 3rd week	1	Superposition of two perpendicular harmonic oscillations:	KCR
	2	Transient currents in RC, LR circuits	PA
	3	quality factor admittance and impedance power and energy in AC circuits	KCR
	4	Classical Langevin's theory of diamagnetism	KSS
July 4th week	1	Lissajous Figures with equal frequency- Analytical treatment.. Uses of Lissajous' figures	KCR
	2	Transient currents in LCR circuits, Problems	PA

	3	Problems	KCR
	4	B-H hysteresis curve ,Hard and soft magnetic materials	KSS
July5th week and Aug 1st week	1	Revision	KCR
	2	Revision	PA
	3	Revision	KCR
	4	Revision	KSS
Aug 1st week 2nd week	1	Question bank discussion	KCR
	2	Question bank discussion	PA
	3	Question bank discussion	KCR
	4	Question bank discussion	KSS

ACADEMIC PLANNER & UNITIZATION OF SYLLABUS
ACADEMIC YEAR 2022-23.
DEPARTMENT : Physics NEP CLASS : IV Sem
Phy.DSCT4: Thermal Physics & Electronics

Week,Month	CLASS	Portions Planned for 1 hour	Teacher
May 1st week	1	**Laws of Thermodynamics**: Review of the concepts of Heat and Temperature – the zeroth law of thermodynamics	KSS
	2	**Thermodynamic Potentials**: Internal Energy, Enthalpy,	KSS
	3	**Semiconductor devices**: Intrinsic semiconductors - concept of holes – effective	KCR
	4	**Electronics**: Integrated Circuits,	PA
May 2nd week	1	Thermodynamic variables - extensive and intensive, Equations of state, PV diagrams	KSS
	2	Helmholtz Free Energy, Gibb's Free Energy, properties and significance.	KSS
	3	concept of holes – effective mass - expression for carrier concentration of holes	KCR
	4	Operational Amplifier, Ideal characteristics of Op-Amp, .	PA
May3rd week	1	**First Law of Thermodynamics:** Differential form of the First Law of Thermodynamics, Application of the first law for (i) Cyclic Process	KSS
	2	**Maxwell's Thermodynamic Relations**: Maxwell's thermodynamic relations (using Thermodynamic potentials),	KSS
	3	mass - expression for carrier concentration of electrons - electrical conductivity and problems.	KCR
	4	Basic concepts of feedback and virtual ground,	PA
May 4th week	1	(ii) Adiabatic Process (iii) Isochoric Process (iv) Isobaric Process and (v) Isothermal Process. Equation of state for	KSS

		an adiabatic process (derivation)	
	2	Applications of Maxwell's Relations (1) Gibbs potential, First order Phase Transitions with examples,	KSS
	3	Extrinsic semiconductors and electrical conductivity (qualitative), p-n junction and its characteristics	KCR
	4	Inverting and Non-Inverting Configurations.	PA
May 5th week and June 1st week	1	Work done in an isothermal and adiabatic process for an ideal gas, Internal Energy as a state function **Second Law of Thermodynamics:** Second law of thermodynamics (Kelvin's & Clausius' statements and their equivalence);	KSS
	2	(2) Clausius – Clapeyron Equation. and problems	KSS
	3	Zener diode as voltage regulator- load and line regulation.	KCR
	4	Applications- Voltage Follower, Addition and Subtraction.	PA
June 2nd week	1	Reversible and irreversible processes with examples; Heat engines: Carnot Engine; Carnot Cycle and its efficiency(derivation),	KSS
	2	Joule-Thomson effect, Liquefaction of gases, Linde's air liquefier .	KSS
	3	**Junction Transistors**: Basics of Bipolar Junction Transistors (BJT), BJT operation,.	KCR
	4	**Digital Electronics:** Analog and Digital circuits, Switching and Logic Levels,	PA
June 3rd week	1	Practical internal combustion engines - Otto and Diesel Cycles Cycles Carnot theorem, (qualitative treatment); Refrigerator- Coefficient of performance	KSS
	2	**Kinetic Theory of Gases**: Maxwell's law of distribution of velocity (without derivation), Deduction of most probable velocity	KSS
	3	Common Base, Common Emitter and Common Collector Characteristics	KCR
	4	Digital Waveform. Number Systems: Decimal Number System, Binary Number System,	PA
June 4th week	1	Concept of Entropy, Second Law of Thermodynamics in terms of Entropy, Entropy in reversible process, Entropy in irreversible processes	KSS
	2	mean velocity and root mean square velocity, Degrees of Freedom,	KSS
	3	Field Effect Transistor (FET) and its characteristics	KCR
	4	Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary.	PA
June 5th week and July 1st week	1	test	KSS
	2	test	PA
	3	test	KCR
	4	test	ASG
July2nd week	1	Principle of increase of entropy, Entropy change in (i) adiabatic process (ii) free expansion (iii) cyclic process (iv)	KSS

		isobaric process	
	2	Law of Equipartition of Energy. Derivation of Specific heats of ideal gas.	PA
	3	Transistor as a CE-Amplifier (qualitative)	KCR
	4	**Digital Circuits**: Logic gates, NOT Gate, AND Gate, OR Gate, NAND Gate,	ASG
	2	**Black body radiation** and its spectral energy distribution; Kirchhoff's law, Stefan's law and Stefan-Boltzmann's law,	PA
	3	problems	KCR
	4	NOR Gate, XOR Gate, Algebraic Simplification, De Morgan's theorem,	ASG
July4th week	1	Problems	KSS
	2	Gravitation: Law of Gravitation, Motion of a particle in a central force field Satellite in a circular orbit	PA
	3	Oscillator (Phase shift) problems	KCR
	4	Realisation of NAND and NOR functions using TTL	ASG
July5th week and Aug1st week	1	revision	KSS
	2	Wien's displacement law, Rayleigh-Jeans law (Statements), Planck's law (derivation)– deduction of Wien's Law & Rayleigh – Jeans Law	PA
	3	revision	KCR
	4	revision	ASG
Aug2nd week	1	Question bank discussion	KSS
	2	Question bank discussion	PA
	3	Question bank discussion	KCR
	4	Question bank discussion	ASG

Name of the Department	**Physics**	**Subject Title: Atmospheric Physics, Relativity and Astrophysics**	
Semester	**VI**	**Paper:601**	**Teacher**
Week/Month	**Class**	**Portions Planned for 1 hour**	
Apr 3rd week	1	Atmospheric Physics, Composition of the earth's atmosphere, Weather and Climate.	PA
	2	Special theory of Relativity Inertial frames of reference.	KSS
	3	Astrophysics - Distances in astronomy- light year and parsec,	KCR
Apr 4th week	1	Vertical structure of the atmosphere Fixed and variable gases, Mechanism of production and destruction of atmospheric constituents,	PA
	2	The velocity of light- Michelson -Morley experiment.	KSS
	3	solar and sidereal time scales, Luminosities, apparent and absolute magnitude scales	KCR
May 1st week	1	Troposphere, Stratosphere, Mesosphere and Thermosphere. Temperature variation in the Atmosphere.	PA
	2	Einstein's postulates and problems	KSS
	3	Stellar spectra, spectral classification,	KCR
May 2nd week	1	Lapse rate, Stability and Instability of atmosphere. Thermodynamics of dry air & moist air.	PA
	2	Derivation of the Lorentz transformations.	KSS
	3	H-R diagram,Temperatures of stars, applications.	KCR

May 3rd week	1	Virtual temperature, Potential temperature, Scale height, Hydrostatic balance, Change of pressure with altitude,	PA
	2	constancy of the speed of light, length Contraction.	KSS
	3	**linear density model** for stars (Calculation of Gravitational Potential	KCR
May 4th week	1	Total potential energy of air column, Green house effect.	PA
	2	time dilation and problems	KSS
May 5st week and June 1st week	1	Problems	PA
	2	Relative nature of simultaneity. the twin paradox.	KSS
	3	Formation of stars (qualitative).	KCR
June 1st week	1	Climate change and revision	PA
	2	The law of addition of velocities.	KSS
	3	Energy production in stars, the proton-proton cycle,	KCR
June 2nd week	1	Aerosols: Sources, size, distribution.	PA
	2	relativistic momentum, relativistic energy,	KSS
	3	Evolution of stars (qualitative)	KCR
June 3rd week	1	transport and residence time.	PA
	2	rest mass, rest energy, mass- energy equivalence	KSS
	3	End stages of stars- white dwarfs, neutron stars and black holes (qualitative)	KCR
June 4th week	1	Test	PA
	2	Test	KSS
	3	Test	KCR
June 5th week and July 1st week	1	Problems	PA
	2	muon decay life time.e relativistic Doppler effect and relativistic collisions.	KSS
	3	Optical telescopes- their types, characteristics and applications	KCR
July 2nd week	1	Revision	PA
	2	Revision	KSS
	3	Revision	KCR
July 3rd week	1	Question bank discussion	PA
	2	Question bank discussion	KSS
	3	Question bank discussion	KCR

Name of the Department	**Physics**	**Subject Title: Nano Physics, Material Science and Elementary particles**	
Semester	**VI**	**Paper:603**	**Teacher**
Week/Month	**Class**	**Portions Planned for 1 hour**	
Apr 3rd week	1	Nano materials: Introduction, classification	PA
	2	Deformation of metals: Introduction, Elastic and Plastic deformation,	KSS
	3	Fundamental interactions: Gravitational, Electro-magnetic, Weak (nuclear) and strong (nuclear) interactions	KCR
Apr 4th week	1	electron confinement, size effects, bulk materials,	PA
	2	Mechanism of deformation	KSS
	3	Classification of elementary particles into Leptons, Quarks and force mediators.	KCR

May 1st week	1	distinct properties of nano materials, Quantum dots,	PA
	2	Deformation by slip. Thermal properties: Introduction	KSS
	3	Leptons: Electron, mu meson, tau meson and the associated neutrinos	KCR
May 2nd week	1	nanowires, Nano-films, multi-layered materials,	PA
	2	Heat capacity, Vibrational heat capacity, Dulong-Petit's law (classical model).	KSS
	3	Lepton quantum number and antiparticles.	KCR
May 3rd week	1	Fullerenes, Carbon nanotubes (CNT), Nano wires,	PA
	2	Einstein's theory, Deby's theory (Qualitative),	KSS
	3	Quarks: Properties of heavier mesons and baryons	KCR
May 4th week	1	Carbon Nano cones, Hackelites and Graphene,	PA
	2	mechanism of heat conduction in metals, ceramics	KSS
	3	Related quantum numbers such as strangeness, The eight-fold way The quark model of Gellmann and Zweig, Types of quarks, Flavour and colour.	KCR
May 5st week and June 1st week	1	Problems	PA
	2	Polymers and Superconductors. Optical properties of metals: Interaction of radiation with materials Atomic transition	KSS
	3	Quarks as constituents of proton. neutron and mesons	KCR
June 1st week	1	Synthesis techniques	PA
	2	Absorption and emission of photons in metals, Optical properties of non-metals. Refractive index	KSS
	3	Qualitative explanation of spin and magnetic moment of nucleons.	KCR
June 2nd week	1	characterization techniques,	PA
	2	Superconductivity: Experimental observation, Critical field, Meissner effect Types of superconductors	KSS
	3	Force Mediators: Mediators for electro-magnetic, weak and strong interactions,	KCR
June 3rd week	1	Production methods for CNT.Mechanical and Electric properties of CNT, Nano material advantages	PA
	2	Phenomenological theories of super conductivity, London equations, B.C.S theory of super conductivity (qualitative),	KSS
	3	Force Mediators: Mediators for electro-magnetic, weak and strong interactions,	KCR
June 4th week	1	Test	PA
	2	Test	KSS
	3	Test	KCR
June 5th week and July 1st week	1	Applications to fuel cells, phosphors, computer chips, sensors.	PA
	2	Application of super conductivity, Josephson effect	KSS

		(AC and DC).	
	3	Photon, W and Z bosons, and gluons. Higgs Bosons. The standard model of elementary particles.	KCR
July 2nd week	1	Revision	PA
	2	Revision	KSS
	3	Revision	KCR
July 3rd week	1	Question bank discussion	PA
	2	Question bank discussion	KSS
	3	Question bank discussion	KCR