| Course | Module/ local needs | Module/ Regional needs | |
|--|-------------------------------|--------------------------------|--|
| MECHANICS& PROPERTIES OF MATTER | | | |
| | PHY-1A | | |
| Vector Analysis | | Divergence and curl of a | |
| | | vector field with derivations | |
| | | and physical interpretation. | |
| Mashanian af martialan | | Vector integration | |
| Mechanics of particles | motion of variable mass | motion of variable mass | |
| | of a rocket. Conservation of | of a rocket. Conservation of | |
| | energy and momentum | energy and momentum | |
| | Collisions in two and three | Collisions in two and three | |
| | dimensions | dimensions. Concept of | |
| | | impact parameter, scattering | |
| | | cross-section, Rutherford | |
| | | scattering | |
| Mechanics of Rigid bodies | rotational kinematic | rotational kinematic | |
| | relations, equation of motion | relations, equation of motion | |
| | for a rotating body, angular | for a rotating body, angular | |
| | momentum, | momentum, Euler equations | |
| | | and its applications, | |
| | | precession of a top, | |
| | | equipoxes | |
| Mechanics of continuous | Classification of beams | Elastic constants of isotropic | |
| media | | solids and their relations. | |
| | | Poisson's ratio and | |
| | | expression for Poisson's ratio | |
| | | in terms of y, n, k. | |
| | | Classification of beams, | |
| Central forces | Motion of satellites, idea of | conservative nature of central | |
| | Global Positioning System | forces, conservative force as | |
| | (GPS) | a negative gradient of | |
| | | ion of motion under a central | |
| | | force Derivation of Kepler's | |
| | | laws.Motion of satellites. | |
| | | idea of Global Positioning | |
| | | System (GPS) | |
| Special theory of relativity | | .Postulates of special theory | |
| | | of relativity.Lorentz | |
| | | transformation, time dilation, | |
| | | length contraction, addition | |
| | | of velocities, mass-energy | |
| | Waxas & Oscillations | | |
| PHV-1R | | | |
| Simple Harmonic | . Principle of superposition | Physical characteristics of | |
| oscillations | beats. Lissajous figures. | SHM, torsion pendulum- | |
| | | measurements of rigidity | |

| | | modulus compound |
|---------------------------|--------------------------------|--------------------------------|
| | | nodulus, compound |
| | | 'a' Dringinlo of |
| | | g, Finicipie of |
| | | superposition, beats. |
| | | Lissajous figures. |
| Damped and forced | | un-damped harmonic |
| oscillations | | oscillator, logarithmic |
| | | decrement, relaxation time, |
| | | quality factor, differential |
| | | equation of forced oscillator |
| | | and its solution, amplitude |
| | | resonance and velocity |
| | | resonance. |
| Complex vibrations | Fourier theorem and | Fourier theorem and |
| I I | evaluation of the Fourier | evaluation of the Fourier |
| | coefficients, analysis of | coefficients, analysis of |
| | periodic wave functions- | periodic wave functions- |
| | square wave, triangular | square wave, triangular |
| | wave, saw tooth wave | wave, saw tooth wave |
| Vibrating strings | modes of vibration of | modes of vibration of |
| · | stretched string clamped at | stretched string clamped at |
| | ends, overtones and | ends, overtones and |
| | harmonics Energy transport | harmonics Energy transport |
| | and transverse impedance | and transverse impedance |
| Vibrations of bars | | Longitudinal vibrations in |
| vibrations of bars | | bars-wave equation and its |
| | | general solution |
| Illtrasonic's | | Production of |
| Citi asonic s | | ultrasonics by piezoelectric |
| | | and magnetostriction |
| | | methods. Detection of |
| | | ultragoniag Applications of |
| | | ultrasonics, Applications of |
| | | ultrasonic waves, SONAR |
| | Maghaniag waxag & agaillation | |
| | PHY-1A | 15 |
| | Rigid body, rotational | Laws of Motion, Motion of |
| Mechanics of Particles | kinematic relations, Equation | variable mass system, |
| | of motion for a rotating body, | Motion of a rocket, |
| | Angular momentum and | Multistage rocket, Concept |
| | Moment of inertia tensor, | of impact parameter, |
| | Euler equations, | scattering cross-section, |
| | 1 | Rutherford scattering- |
| | | Gyroscope, |
| | | Precession of the |
| | | equinoxes |
| Motion in a Central Force | | conservative nature of central |
| Field | | forces. Equation of motion |
| | | under a central force |
| | | Kenler's laws of planetary |

| Relativistic Mechanicssatellites, Basic idea of Global Positioning System (GPS), weightlessness,Relativistic MechanicsFrames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment. Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, Forced string clamped at ends, Overtones and Harmonics.Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, formatic aberration, Spherical aberration, Chromatic aberration, formatic aberratio | | | motion-Proofs, Motion of |
|--|------------------------|-------------------------------|---------------------------------|
| Relativistic MechanicsGlobal Positioning System (GPS), weightlessness, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment. Postulates of Special theory of relativity, Lorentz transformation, variation of mass with velocity, Einstein's mass-energy relation.Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillators Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator and solution of stretched string clamped at ends, Overtones and Harmonics.Simple harmonic oscillator and solution of stretched string clamped at ends, Overtones and Harmonics.Ultrasonic'sWAVE OPTICS PHY-2AProduction of ultrasonic waves, SONARInterference of lightStokes' treatment, Fineed Hims, Newton's rings in reflexed films, Newton's rings in reflexed light, Michelson interference films, Stokes' reatment, films, Newton's rings in reflexed light, Michelson interference | | | satellites, Basic idea of |
| Relativistic Mechanics(GPS), weightlessness, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment. Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillators: Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, therefor | | | Global Positioning System |
| Relativistic Mechanics Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment. Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation. Undamped, Damped and Forced oscillations Resonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillations: Coupled oscillators Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, Forced harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator Vibrating Strings Modes of vibration of stretched string clamped at ends, Overtones and Harmonics. Transverse wave propagation along a stretched string Ultrasonic's WAVE OPTICS PHY-2A Production of ultrasonic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Spherical land wedge-shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | (GPS), weightlessness, |
| Image: Interference of lightResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillatorsSimple harmonic oscillator and Quality factor Coupled oscillatorsVibrating StringsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, Forced harmonic oscillatorVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Simple harmonic oscillator, differential equation, Damped harmonic oscillator, Forced harmonic oscillatorUltrasonic'sWAVE OPTICS PHY-2AProduction of ultrasonic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Spherical aberrat | Relativistic Mechanics | | Frames of reference, Galilean |
| Image: | | | transformations, absolute |
| experiment. Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillators: Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillatorVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonic solutions of ultrasonic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Spherical aberration, Stokes' treatment, Interference of lightMonochromatic aberration, Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interference | | | frames, Michelson-Morley |
| Image: state of the second s | | | experiment. |
| Image: Interference of lightResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced oscillatorsVibrating StringsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmon | | | Postulates of Special theory of |
| IndexpedienceResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillations: Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced oscillatorsVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Simple harmonic oscillator, and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, Forced harmonic oscillator, Forced harmonic oscillator, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic solutions of ultrasonic solution of turasonic solution of ultrasonic solution of ultrason | | | relativity, Lorentz |
| Image: Link of the second se | | | transformation, time dilation, |
| Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillators: Coupled oscillators: Forced harmonic oscillatorSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillatorVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Transverse wave propagation along a stretched stringUltrasonic'sProduction of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonic waves, SONARLitrasonic 'sWAVE OPTICS PHY-2AAberrationsMonochromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Sherical aberration, Chromatic abe | | | length contraction, variation |
| Lundamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillators: Coupled oscillators: Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillatorVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Transverse wave propagation along a stretched string ultrasonic's by piezoelectric and magnetostriction methods, Detection of ultrasonic waves, SONARUltrasonic'sWAVE OPTICS PHY-2AAberrationsMonochromatic aberration, Chromatic ab | | | of mass with velocity, |
| Undamped, Damped and Forced oscillationsResonance, Logarithmic decrement, Relaxation time and Quality factor Coupled oscillations: Coupled oscillatorsSimple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator, along a stretched stringUltrasonic'sProduction of ultrasonics, Optication of ultrasonic waves, SONARUltrasonic'sPhy-LaAberrationsMonochromatic aberrations, Spherical aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Stokes' treatment, Interference of lightInterference of lightInterference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | Einstein's mass-energy |
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| and Quality factor Coupled oscillations: Coupled oscillations: Coupled oscillatorsdifferential equation, Damped harmonic oscillator, Forced harmonic oscillatorVibrating StringsModes of vibration of stretched string clamped at ends, Overtones and Harmonics.Transverse wave propagation along a stretched stringUltrasonic'sProduction of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonic waves, SONARMoterationsModes OPTICS PHY-2AAberrationsMonochromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | Forced oscillations | decrement, Relaxation time | and solution of the |
| Coupled oscillations: Damped narmonic oscillator, Coupled oscillators Forced harmonic oscillator Vibrating Strings Modes of vibration of stretched string clamped at ends, Overtones and Harmonics. Transverse wave propagation along a stretched string Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR Aberrations WAVE OPTICS PHY-2A Aberrations Monochromatic aberration, Chromatic aberration, Chromatic aberration, Chromatic aberration, Spherical aberration, Chromatic aberration, Shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | and Quality factor | differential equation, |
| Vibrating Strings Modes of vibration of stretched string clamped at ends, Overtones and Harmonics. Transverse wave propagation along a stretched string Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR Materia Comparison WAVE OPTICS PHY-2A Aberrations Monochromatic aberration, Chromatic aberration, Chroma | | Coupled oscillations: | Damped narmonic oscillator, |
| Vibrating Strings stretched string clamped at ends, Overtones and Harmonics. infailsverse wave propagation along a stretched string Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonic waves, SONAR Example WAVE OPTICS PHY-2A Aberrations Monochromatic aberration, Chromatic aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | Vibrating Strings | Nodes of with ration of | Transverse were proposition |
| Stretched string champed at ends, Overtones and Harmonics. along a stretched string Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonic waves, SONAR WAVE OPTICS PHY-2A Monochromatic aberrations, Spherical aberration, Chromatic aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | Vibrating Strings | stratched string clamped at | along a stratched string |
| Lites, overtones and Harmonics. Production of ultrasonic by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR Ultrasonic WAVE OPTICS PHY-2A Aberrations Monochromatic aberration, Chromatic aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | ands. Overtones and | along a stretched string |
| Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR WAVE OPTICS PHY-2A Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | Harmonics | |
| Ultrasonic's Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR WAVE OPTICS PHY-2A Wonochromatic aberrations, Spherical aberration, Chromatic aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | Tharmonies. | |
| Interference of light Interference of light Interference of light Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interference | Ultrasonic's | | Production of |
| Aberrations Monochromatic aberration, Chromatic aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | ultrasonics by piezoelectric |
| methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR WAVE OPTICS PHY-2A Aberrations Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | and magnetostriction |
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| Aberrations WAVE OPTICS PHY-2A Aberrations Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | ultrasonics, Applications of |
| WAVE OPTICS PHY-2A Aberrations Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | ultrasonic waves, SONAR |
| WAVE OPTICS PHY-2A Aberrations Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | |
| Aberrations Monochromatic aberrations, Spherical aberration, Chromatic aberration Interference of light Stokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | WAVE OPTICS PHY-2A | |
| Interference of lightSpherical aberration, Chromatic aberrationInterference of lightStokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | Aberrations | | Monochromatic aberrations, |
| Interference of lightChromatic aberrationInterference of lightStokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | Spherical aberration, |
| Interference of lightStokes' treatment, Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | Chromatic aberration |
| Interference in thin films: Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | Interference of light | | Stokes' treatment, |
| Plane parallel and wedge- shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | Interference in thin films: |
| shaped films, colours in thin films, Newton's rings in reflected light, Michelson interferometer | | | Plane parallel and wedge- |
| films, Newton's rings in reflected light, Michelson interferometer | | | shaped films, colours in thin |
| reflected light, Michelson interferometer | | | films, Newton's rings in |
| interferometer | | | reflected light, Michelson |
| | | | Interterometer |
| Polarisation of light Nicol prism as polarizer and another Quarter survey state Double refraction, Brewster's | Polarisation of light | Nicol prism as polarizer and | Double retraction, Brewster's |
| analyzer, Quarter wave plate, law, Malus law, Nicol prism, | | analyzer, Quarter wave plate, | law, Maius law, Micol prism, |
| nall wave plate INICOL prism as polarizer and analyzer Quarter wave plate | | nan wave plate | analyzer Quarter wave plate |

| | | Half wave plate, Plane, Circularly and Elliptically polarized light- Laurent's half shade polarimeter: determination of specific rotation, <i>Babinets's</i> <i>compensator</i> . |
|---|---|---|
| Fibre Optics | different types of fibers, rays and modes in an optical fiber, Principles of fiber communication | different types of fibers, rays and modes in an optical fiber, Principles of fiber communication |
| Lasers and Holography | He-Ne laser, Ruby laser, Applications of lasers; Holography | Laser principle, Einstein coefficients, Types of lasers- He-Ne laser, Ruby laser, Applications of lasers; Holography: Basic principle of holography, Applications of holography. |
| Diffraction of light | Fresnel and Fraunhoffer diffractions | Fresnel and Fraunhoffer diffractions, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, |
| THERMO | DYNAMICS & RADIATION PHY-2B | PHYSICS |
| Kinetic theory of gases | Viscosity of gases-thermal conductivity-diffusion of gases | Transport phenomena – Mean free path - Viscosity of gases- thermal conductivity- diffusion of gases. |
| Thermodynamics | Entropy and disorder- Entropy of Universe- Temperature-Entropy (T-S) diagram and its uses | Carnnot's engine and its efficiency-Carnot's theorem-Second law of thermodynamics. Kelvin's and Claussius statements-Entropy, Entropy and disorder- Entropy of Universe– Temperature-Entropy (T-S) diagram and its Uses |
| Thermodynamic potentials and Maxwell's equations | Joule Kelvin effect | Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius- |

| | | Clayperon's equation- Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect- |
|---|--|---|
| Low temperature Physics | Joule Kelvin effect-Porous plug experiment effects of chloro and fluoro carbons on ozone layer. <i>Principles of Refrigeration</i> | Joule Kelvin effect- Porous plug experiment Joule Thomson cooling- Liquefaction of helium, Kapitza's method- Adiabatic demagnetization, Production of low temperatures effects of chloro and fluoro carbons on ozone layer. <i>Principles of</i> <i>Refrigeration</i> |
| Quantum theory of radiation | <i>Ferry's total radiation</i> <i>pyrometer</i> -Wein's displacement -Disappearing filament optical pyrometer | Ferry's black body- distribution of energy in the spectrum of black body- <i>Ferry's total</i> <i>radiation pyrometer</i> - Wein's displacement -Disappearing filament optical pyrometer- experimental determination – Angstrom pyrheliometer- determination of solar constant, Temperature of Sun. |
| ELECTRICITY, MAGNETISM &ELECTRONICS PHY 5 – 3A | | |
| Electric field intensity and potential | potential due to i) a point charge, ii) charged spherical shell | Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii) charged spherical shell Electric dipole moment |
| | | and molecular |

| | | polarizability- Electric displacement D, electric polarization P –relation between D, E and P- Dielectric constant and |
|--|--|--|
| Electric and magnetic fields | Comparison of magnetic shell and circular coil – Hall effect | susceptibility Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid- Comparison of magnetic shell and circular coil – Hall |
| Electromagnetic induction | energy stored in magnetic field. Transformer - energy losses - efficiency. | Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field. Transformer - energy losses - efficiency. |
| Alternating currents and electromagnetic | LCR series and parallel resonant circuit, Q –factor, power in ac circuits | Relation between current and voltage in LR and CR circuits using vector diagrams, LCR series and parallel resonant circuit, Q – factor, power in ac circuits |
| Maxwell's equations | | Maxwell's wave equation (with derivation) transverse nature of electromagnetic waves. Poyinting theorem s |
| Basic electronics: | PN junction diode, Zener diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation between α , β and γ - transistor (CE) characteristics , Transistor as an amplifier. | PN junction diode, Zener diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation between α , β and γ - transistor (CE) characteristics , Transistor as an amplifier. |
| Digital electronics | De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, Ex-OR gate, Half adder and Full adder | Conversion of binary to decimal system and vice versa. Binary subtraction Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as |

| | | universal gates, Ex-OR gate, |
|---|---|---|
| | MODEDN DHVSLCS | Hall addel allo Full addel |
| MODERN PHYSICS PHY 6—3A | | |
| Atomic and molecular physics | Zeeman Shift -Raman effect, hypothesis, Applications of Raman effect | Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and j- j coupling schemes. Zeeman effect- <i>Experimental arrangement-</i> <i>Derivation for Zeeman Shift</i> - |
| | | Raman effect, hypothesis, Applications of Raman effect |
| Matter waves & Uncertainty Principle | Gaama ray microscope | Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves – Group velocity and Phase velocity Davisson and Germer experiment – Heisenberg's uncertainty principle. <i>Gaama</i> <i>ray microscope</i> |
| Quantum (wave) mechanics | Application of Schrodinger wave equation to particle in one dimensional infinite box | Schrodinger time independent and time dependent wave equations- derivations. Physical interpretation of wave function. Eigen functions, Eigen values. Application of Schrodinger wave equation to particle in one dimensional infinite box |
| General Properties of Nuclei | | nucleus -size, mass, charge density (matter energy), binding energy, magnetic moment, electric moments. Liquid drop model and Shell model |
| Radioactive Decay | Alpha decay: basics of α- decay processes. Theory of a- decay, | Alpha decay: basics of α- decay processes. Theory of a- decay, Gamow's theory, Geiger Nuttal law. β-decay, Energy kinematics for β- decay, positron emission |
| Crystal Structure | diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method. Powder method | Amorphous and crystalline materials, unit cell, Miller indices, reciprocal lattice, types of lattices, diffraction of X-rays by crystals, |

| | | Bragg's law, experimental |
|-------------------|------------------------------|---------------------------------|
| | | techniques, Laue's method. |
| | | Powder method |
| Superconductivity | Type I and type II | critical temperature - critical |
| - | superconductors - | field - Meissner effect |
| | applications of | – Isotope effect - Type I and |
| | superconductors | type II superconductors - |
| | | applications of |
| | | superconductors |
| | Renewable Energy | |
| | PHY7-3C | |
| UNIT-I | Forms of energy, Energy | Forms of energy, Energy |
| | flow diagram to the earth. | flow diagram to the earth. |
| | Role of energy in economic | Role of energy in economic |
| | and social development. | and social development. |
| | Environmental Effects: air | Environmental Effects: air |
| | and water pollution, | and water pollution, |
| | depletion of ozone layer, | depletion of ozone layer, |
| | global warming, biological | global warming, biological |
| | damage due to environmental | damage due to environmental |
| | degradation. | degradation. |
| | Indian Energy Seener Energy | Energy consumption in |
| UNII-II | resources available in India | unious sectors operav |
| | urban and rural anaray | various sectors, energy |
| | consumption nuclear energy | resources, coal, on, natural |
| | - promise and future | bydroelectric power Indian |
| | promise and rutare | Energy Scene: Energy |
| | | resources available in India |
| | | urban and rural energy |
| | | consumption, nuclear energy |
| | | - promise and future |
| UNIT-III | | solar water heating system, |
| | | Applications, Solar cooker. |
| | | Solar cell, Types of solar |
| | | cells. Wind Energy: |
| | | Introduction, Principle of |
| | | wind energy conversion, |
| | | Components of wind turbines |
| UNIT-IV | | Principle of ocean thermal |
| | | energy conversion, Tidal |
| | | power generation, Tidal |
| | | energy technologies, Energy |
| | | from waves. Hydrogen |
| | | Energy |
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| UNIT-V | Sources of biomass | _ |
|--------|--------------------------|-------|
| | Conversion of biomass | into |
| | fuels – Energy three | ough |
| | fermentation – Pyrol | ysis, |
| | gasification and combust | ion |
| | – Aerobic and anaerobic | bio- |
| | conversion | |
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| Solar Thermal and Photovoltaic Aspects | | |
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| РНУ8-1-3С | | |
| Unit I | Anti-reflective coating. | Solar intensity measurement -pyrheliometer. 2. Radiative Properties and Characteristics of Materials: Kirchoff's law – Relation between absorptance, emittance and reflectance; Selective Surfaces - preparation and characterization, Types and applications; Anti-reflective coating. |
| UNIT-II | | Description of flat plate collector, Liquid heating type FPC, Energy balance equation, Efficiency, Temperature distribution in FPC |
| Unit-III | Physics of solar cell –Type of interfaces, homo, hetero andschottky interfaces, Photovoltaic Effect, Equivalent circuit of solar cell | Physics of solar cell –Type of interfaces, homo, hetero andschottky interfaces, Photovoltaic Effect, Equivalent circuit of solar cell |
| UNIT-IV | Solar cell module assembly – Steps involved in the fabrication of solar module, Module performance | Solar cell module assembly – Steps involved in the fabrication of solar module, Module performance. Solar PV system and its components, PV array, inverter, battery and load. |
| UNIT-V | Solar hot water system (SHWS), Types of SHWS, Standard method of testing the efficiency of SHWS; Passive space heating and cooling concepts, Solar desalinator and drier, Solar thermal power generation | Solar hot water system (SHWS), Types of SHWS, Standard method of testing the efficiency of SHWS; Passive space heating and cooling concepts, Solar desalinator and drier, Solar thermal power generation |