- Three features of moral discourse (C. L. Stevenson), Three characteristics of moral judgment (R. M. Hare) - Concept of prescriptivity, supervenience and universalis ability.
- Ethical skepticism - Logical positivist conception of moral judgments –Russell, Ayer and Carnap.

Module 4.

- Biomedical ethics – core issues – Doctor-patient relationship, concept of informed consent, debate on ethical issues of abortion, euthanasia, surrogacy and artificial reproductive techniques.

Module 5.

- Environmental ethics – Why environmental ethics is significant today? Critique of Anthropocentrism and technocentrism.
- Deep ecology of Arne Naess – differences between deep and shallow ecology, Ecosophy – T, biospherical egalitarianism.
- Ecological resistance movements in India – Chipko and Narmada Bachao Andolan – inspirations and goals.

Module 6.

- Cyberethics -The Ten Commandments of Computer Ethics proposed by the Computer Ethics Institute, the problem of personal privacy in cyber world.

24. Physics

Unit I

Module 1. Mathematical physics

- Dimensional analysis, Vector algebra and vector calculus, Linear algebra, matrices, Cayley- Hamilton Theorem, Eigen values and eigen vectors. Linear differential equations of first and second order. Fourier-series, Fourier and Laplace transforms. Elementary complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Special functions (Hermite, Bessel, Laguerre and Legendre). Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

Module 2. Classical Mechanics

- Newton's laws, Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions-scattering in laboratory and Centre of mass frames. Rigid body dynamics – moment of inertia tensor. Non–inertial frames and pseudoforces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity- Lorentz transformations, relativistic kinematics and mass-energy equivalence, Poisson brackets and canonical transformations. Hamiltonian-Jacobi theory.

Unit II

Module 1. Quantum Mechanics

- Wave-particle duality. Schrodinger equation (time dependent and time- independent). Eigenvalue problems (particle in a box, harmonic oscillator). Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in certain potential: orbital angular momentum, angular momentum algebra, spin, addition

of angular momenta. Hydrogen atom. Stern-Gerlach experiment. Time-independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules. Identical particles, Paulis exclusion principle, spin-statistics connection, WKB approximation. Elementary theory of scattering: phase shifts, partial waves, Born approximation. .

Module 2. Statistical Mechanics

- Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro and macro states. Micro- canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Blackbody radiation and Planck's distribution law, Bose- Einstein condensation.

Unit III

Module 1. Electromagnetic Theory

- Electrostatics: Gauss's law and its applications, Laplace and Poissons equations, boundary value problems. Magnetostatics: Biot- Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotopic media; boundary conditions on the fields at interfaces. Scalar and vector potentials, gauge invariance. electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields, Dispersion relations in plasma. Lorentz invariance of Maxwell's equations. Transmission lines and wave guides. Radiation – from moving charges and dipoles and retarded potentials.

Module 2. Atomic and Molecular Physics

- Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom, hyperfine structure and isotopic shift, width of spectrum lines , LS & JJ couplings. Zeeman, Paschen –Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemical shift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, Rotational, Vibrational and Raman spectra of diatomic molecules, selection rules. Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, population inversion, rate equation. Modes of resonators and coherence length.

Unit IV
Nuclear and Particle Physics

- Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi-empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge- symmetry of

nuclear forces. Deuteron problem. Evidence of shell structure, single-particle shell model, its validity and limitations. Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and Fusion. Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions. Classification of fundamental forces. Elementary particles and their quantum numbers(charge, spin, parity, isospin, stangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P and T invariance. Application of symmetry arguments to particle reactions. Parity non- conservation in weak interaction. Relativistic kinematics.

Unit V
Condensed Matter Physics

- Bravais Lattices, Reciprocal lattice, Diffraction and the structure factor. Bonding of solids, Elastic properties, phonons, lattice specific heat. Free electron theory and electronic specific heat. Response and relaxation phenomena. Drude model of electrical and thermal conductivity. Hall effect and thermoelectric power. Electron motion in a periodic potential, band theory of solids: metals, insulators and semiconductors, First and second order phase transitions. Diamagnetism, Paramagnetism and ferromagnetism, Superconductivity: type1 and type 2 superconductors, Josephson junctions. Superfluidity. Defects and dislocations Ordered phases of matter: translational and orientational order, kinds of liquid crystalline order. Quasi crystals.

Unit VI
Electronics

- Semiconductor devices (diodes, junctions, transistors, field effect devices, homo and hetero- junction devices). Transistor amplifiers and oscillators, device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similar circuits). A/D and D/A converters. Microprocessor and microcontroller basics. Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting.

25. Political Sciences

Unit I
Modern Political Analysis

Module 1. Political Science : Nature and Development

- Evolution of Political Science as a Discipline –Ancient, Modern and Contemporary Developments
- Classical and Normative Approaches
- Positivism [Behavioralism and Post - behaviouralism]
- Liberal and Neo-liberal -Marxian and Post/ Neo-marxian approaches

Module 2. Substance of Political Science

- State, Power, Authority, Legitimacy, Civil Society, Identity Politics [Caste, Gender and Religion]

Module 3. Positivist Theories

- System Analysis [David Easton]-Structural Functional Analysis [Gabriel Almond]-Communication Theory [Karl Deutsch]

Module 4. Theories of Democracy

- Elite Theory [Pareto, Mosca, Michels and Sartori]-Pluralism [Dahl]-
- Participatory and Deliberative Democracy – Public Sphere [Habermas]

Module 5. Political Culture and Political Socialization