Each semester contain one theory and one practical in each Semester. Each theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of at least 4 hours duration in one day and shall carry 50 marks. The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units.

B.Sc.-I (Sem.-I)
(Mechanics, Properties of Matter, Waves and Oscillation).

UNIT-I: Kepler's laws of planetary motion, Newton's law of gravitation, acceleration due gravity, variation with altitude and depth, Gravitational field, Gravitational Potential; Gauss's theorem, gravitational potential and intensity due to uniform solid sphere at a point inside and outside the sphere. Numericals.

UNIT-II: Motion of a Rigid body; rotational motion; moment of inertia; Principle of Perpendicular & Parallel axes, Radius of Gyration; M.I of regular shaped bodies like ring, disc, hollow sphere, solid sphere, cylinder & bar about different axes. Linear momentum, angular momentum, Conservation of Linear Momentum & angular momentum. Numericals.

UNIT-III: Linear S.H.M, Angular S.H.M, Differential equations and solutions. Displacement, Velocity and acceleration, Kinetic and Potential energy. Simple pendulum, compound pendulum, Kater's Reversible pendulum, spring and mass system, Vibration of a magnet, bifilar oscillations, Damped and forced harmonic oscillations, Resonance. Numericals.

UNIT-IV: Superposition of two SHM of same frequency along the same line Interference, superposition of two mutually perpendicular SHM of same Frequency, Lissajous figures. Standing waves, velocity of longitudinal waves (Newton's formula) velocity of waves by Kundt's tube, velocity of transverse waves in stretched string, harmonics and overtones. Production and detection of ultrasonic waves and its applications. Numericals.

UNIT-V: Introduction of Elasticity; Hooke's Law of Elasticity, Three Elastic constants; Relation between U, s, k and h. Bending of beam and Bending moment; Cantilever, Depression of centrally loaded beam, twisting couple, torsional pendulum; Maxwell's needle. Numericals.

UNIT-VI: Kinematics of moving fluids; Streamline and turbulent flow, viscous drag, Coefficient of viscosity, equation of continuity; Euler's equation, Bernoulli's theorem, Poiseulle's equation, Reynold's number, Terminal velocity, Stokes' law, Variation of viscosity with temperature.
Surface tension, angle of contact and wetting, Jaeger's method. Numericals.

Reference Books:
1. Mechanics – Chadha T.K.
2. Waves and Oscillations – Chaudhary R.N.
3. University Physics I Mechanics of Particles waves and Oscillations – Kamal, Anwar
4. Mechanics – Shukla R.K.
5. Mechanics – Shrivastava P.K.
6. Properties of Matter – Murugeshan R

7. Properties of Matter – Brijlal
8. Text book of vibrations and waves – Puri, MacMillan Publisher India Ltd.
9. Barkeley Physics course Vol. I Eno Purcell Ed. (McGraw Hill)
10. The Feymann Lectures in Physics – Vol. I, R.P.Feymann, R.B.Lighton & M. Sands
11. Mechnics & properties of matter – D.S.Mathur
12. Fundamental of Physics – Halliday & Resncik (6th edition)
13. Concepts of Physics Vol I & Vol II by H.C.Varma

Practicals:

1. Study of laws of Parallel and perpendiculars axes for moment of inertia.
2 Determination of coefficient of restitution for inelastic collision.
3. Moment of inertia of fly wheel.
4. Study of compound pendulum.
5. To determine moment of inertia of a body using bifilar suspension.
6. Modulus of rigidity by Torsional Pendulum.
7. Acceleration due to gravity by Kater's pendulum.
8. Study of Oscillations of mass under different combinations of springs.
9. Young's modulus by cantilever.
10. Young's Modulus by bending of beam.
11. Modulus of rigidity by statical method.
12. Young's modulus by Vibration Method.
13. Modulus of rigidity by Maxwell's needle.
14. Coefficient of Viscosity by Poiseulle's method.
15. Surface tension by Quincke's method.
16. Determination of Surface tension by Jager's method.

B.Sc.-I (Sem.-II)
(Kinetic theory, Thermodynamics and electric currents)

UNIT-I: Ideal Gas - Kinetic theory of Gases (Assumption, equation without derivation), deduction of Boyle's law, interpretation of temp.; Estimation of RMS speed of molecule; Estimation of Avagadro's number; degrees of freedom; equipartition of energy; specific heat of monatomic gas; extension to di & tri-atomic gases.

Real Gas- Vander Waals gas equation of state, Comparison with experimental P-V curves, the critical constants; nature of Vander-Waals forces.

T**ransport Phenomena in gases**: Molecular Collision, mean free path, Brownian motion and collision cross section. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. Numericals

UNIT-II: The laws of thermodynamics

The zeroth law, P-V indicator diagrams, work done by and on the system; First law of thermodynamics, internal energy as a state function and other applications; Reversible and irreversible changes; Carnot Cycle and its efficiency for perfect gases, The Second law of thermodynamics; different versions of second law, Carnot theorem; Entropy, S-T diagram; Principle of increase of Entropy; The thermodynamic scale of temperature; its identity with the

perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics. Numericals.

UNIT-III: Liquefaction of Gases

Joule-Thomson effect, Joule's coefficient, Boyle and inversion temperature; Principle of regenerative cooling and Cascade Cooling, Liquefaction of hydrogen and helium Thermodynamic relationships- Thermodynamic Variables, Extensive and intensive, Maxwell's general relationship; application to Joule-Thomson cooling and adiabatic cooling in a general system. Clausius-clapeyron heat equation, thermodynamic Potentials and equilibrium of Thermodynamical systems, relation with thermodynamical variables.

UNIT-IV: Motion of Charged Particles in Electric and Magnetic fields

(Note: The emphasis should be on Mechanical aspects, and not on the details of the apparatus mentioned which indicated as applications of principles involved.) E as an accelerating field, electron gun, case of discharge tube, linear accelerator (linac), E as a deflecting field, Transverse magnetic field, Mass spectrograph, velocity selector, curvatures of tracks for energy determination of nuclear particles, Principle of cyclotron. Mutually perpendicular E and B fields, velocity selector, its resolution. Numericals.

UNIT-V: Network Theorem

Thevenin's theorem, superposition theorem (mesh current analysis), Maximum power transfer theorem, some applications. Ballistic galvanometer (theory, charge sensitivity, effect of damping), Application of B.G: Determination of capacitance and high resistance by method of leakage Varying Currents: Steady currents, current density J, non-steady current and continuity equation, Kirchoff's laws and analysis of multi-loop circuits, Rise and decay of currents in LR, Rise and decay & charge in CR circuits, and in LCR circuit, resonating frequency. Numericals.

UNIT-VI: Alternating Currents

A.C. currents, complex numbers and their applications in solving A.C. circuits using J operater, pure R, L, C and their combinations, reactance and impedance, series and parallel resonance, Q-.factor, power consumed by A.C. circuit, power factor. Self and mutual inductance, theory of transformer and energy losses in transformer. Numericals.

Refernce Books:

1. Heat and thermodynamics – D.S.Mathur
2. Text book of Heat – J.B.Rajam
3. Heat and thermodynamics – Rajam & Arora
4. Heat – Rajkumar & Sharma
5. Electricity & Magnetics – Chakraborty P.
6. Foundations of Physics Vol. I & Vol. II – Gambhir R.S.
7. Electromagnetics – Laud B.B.
8. Electromagnetic field & waves – Sarwate V.V.
9. Electricity and Magnetism Vol. II – Berkley Physics Course
10. Electricity and Magnetism – D.N.Vasudeva
11. Electricity and Magnetism – Brijlal & Subramaniam
12. Electrodynamics – S.L.Gupta & R.Singh

13. Electricity & Magnetism – Reitz & Millford
14. Electricity & Magnetism – A.S.Mahajan & A.A.Rangawala (TMH)
15. Principle of electricity & Magnetism – Panofsky & Philips
16. Electricity & Magnetism – S.S.Atwood
17. Electromagnetic waves & radiating systems – E.C. Jordan

Practical: (Every student will have to perform at least 10 experiments from the following list. At the time of examination, each student will have to perform 1 (one) experiment.)

1. Heating efficiency of electrical Kettle with varying voltages.
2. Determination of "J" by Callendar and Barne's method.
3. Cp/Cv by Clement and Desorme's method.
4. Thermal conductivity of an insulator by Lee's disc method.
5. Determination of charge sensitivity of ballistic galvanometer.
6. Measurement of low resistance by Carey-foster Bridge.
7. Measurement of low resistance by potentiometer.
8. Measurement of inductance by phasor diagram method.
9. Measurement of capacitance by phasor diagram method.
10. Study of frequency resonance of series LCR circuit and determination of Q-factor.
11. To study behavior of R-C.circuit as a filter.
12. To determine high resistance by leakage method.
13. C1 / C2 by De-Sauty's method.
14. Verification of laws of capacitances.
15. Study of transformer.
16. Verification of Kirchoff's law, using electrical network.
17. Verification of Maximum power transfer theorem.
18. Verification of Thevenin's theorem.
19. Verification of Norton's theorem.
20. Verification of Milliman's theorem.