

**LESSON PLAN FOR THERMAL PHYSICS PAPER(2016)
FOR PHYSICS (HONS) SEMESTER III**

MONTH(2016)	DAYS	SYLLABUS TO BE COVERED
JULY	20 th July - 23 rd July	An introduction to the Kinetic Theory of gases, Maxwell's Boltzmann Law of Distribution of Velocities in an ideal gas.
	25 th July - 29 th July	Experimental verification of distribution law (both direct and indirect), Most probable velocity, RMS velocity and Average velocity, most probable speed, RMS speed and average speed, Most probable energy and average energy, degrees of freedom
AUGUST	1 st Aug - 5 th Aug	Mean free path - definition. Estimation of mean free path using zeroth approximation and first order approximation and its experimental verification, Introduction to the transport phenomenon in ideal gases
	8 th Aug - 12 th Aug	Transport phenomenon in ideal gases: viscosity (to find the coefficient of viscosity using Maxwell's law of velocities), thermal conductivity (coefficient of thermal conductivity using Maxwell's law of velocities) and diffusion (coefficient of self diffusion using Maxwell's law of distribution of velocities)
	16 th Aug - 19 th Aug	Brownian motion and its significance. Einstein's theory and Lengevin's theory for Brownian motion, applications of Brownian motion. Introduction to real gases.
	22 nd Aug - 26 th Aug	Behavior of real gases: Deviation from ideal gas equation, description of the results of Andrew's experiment on carbon dioxide, deduction of Van der Waal's equation of state for real gases,

		values of critical constants.
SEPTEMBER	29th Aug - 2nd Sept	Limitations of Van der Waal's equation of state, law of corresponding states, Boyles temperature and critical temperature. Comparison of P-V curves : both experimental and theoretical. Introduction of the Thermodynamic systems and thermodynamic variables.
	12th Sept - 16th Sept	Thermodynamic equilibrium, Zeroth law of thermodynamics and concept of temperature in thermal equilibrium, concept of work, heat and internal energy. First law of thermodynamics and its differential form, first law for various processes, applications of first law of thermodynamics: relation between c_p and c_v , relation between T,P and V for an adiabatic process. Work done during adiabatic and isothermal processes, relation between adiabatic and isothermal elasticity, relation between slopes for adiabatic and isothermal curves for P-V diagrams, Joule Thomson effect - Porous Plug experiment, derivation of Joule Thomson coefficient and its effect for both ideal and real gases, temperature of inversion.
	19th Sept - 23rd Sept	Compressibility and expansion coefficient., problems related to the first law of thermodynamics, Reversible and irreversible processes with examples, conversion of work into heat and heat into work, Heat engines, Carnot's cycle.
	26th Sept - 30th Sept	Test Carnot cycle continued, Carnot engine and its efficiency, Refrigerator and its coefficient of performance, Second law of

		thermodynamics: Kelvin Planck and Clausius statements and their equivalence, Carnot theorem, Applications of second law of thermodynamics.
OCTOBER	3rd oct - 7th Oct	Thermodynamic scale of temperature and its equivalence to perfect gas scale, Concept of entropy , Clausius theorem, Clausius inequality, second law of thermodynamics in in terms of entropy, entropy of a perfect gas, Principle of increase of entropy, entropy changes in reversible and irreversible processes ith examples, entropy of the universe
	17th Oct - 21st Oct	Temperature entropy diagram for Carnot cycle, problems related to the first and the second law of thermodynamics. Third law of thermodynamics and unattainability of absolute zero.
	24th Oct - 28th Oct	Thermodynamic potentials: internal energy, enthalpy, Helmholtz free energy, Gibb's free energy: their definition, properties and applications, magnetic work, cooling due to adiabatic demagnetization, first and second order phase transitions with examples
		Test
NOVEMBER	1st Nov - 4th Nov	Clausius Clapeyron equation and Ehrenfest equations. Derivation of Maxwell's Thermodynamic relations and their applications and Maxwell's relations: Clausius Clapeyron equation, value of $c_p - c_v$,TdS equation s and Energy equations.

**INTERNAL ASSESSMENT SCHEDULE FOR THERMAL PHYSICS PAPER
FOR B.SC(HONS) PHYSICS SEMESTER III**

DATE	TEST/ASSIGNMENT	SYLLABUS
23rd September	Test	Applications of Kinetic theory of gases, mean free path and Van der Waal's equation of state, applications of first law of thermodynamics
30th September	Assignment	Problems related to kinetic theory of gases and first law of thermodynamics
28th October	Test	Theorems related to second law of thermodynamics and its applications .
3rd November	Assignment	Applications of Maxwell's Thermodynamic relations m