ACADEMIC PLANNER & UNITIZATION OF SYLLABUS
ACADEMIC YEAR 2024-25.
DEPARTMENT : Physics NEP CLASS : IV Sem
Phy.DSCT4: Thermal Physics & Electronics

Week,Month	CLASS	Portions Planned for 1 hour	Teacher
FEB LAST week	1	**Laws of Thermodynamics**: Review of the concepts of Heat and Temperature – the zeroth law of thermodynamics	CRS
	2	**Thermodynamic Potentials**: Internal Energy, Enthalpy,	NJ
	3	**Semiconductor devices**: Intrinsic semiconductors - concept of holes – effective	CRS
	4	**Electronics**: Integrated Circuits,	NJ
MARCH 1ST week	1	Thermodynamic variables - extensive and intensive, Equations of state, PV diagrams	CRS
	2	Helmholtz Free Energy, Gibb's Free Energy, properties and significance.	CRS
	3	concept of holes – effective mass - expression for carrier concentration of holes	NJ
	4	Operational Amplifier, Ideal characteristics of Op-Amp, .	NJ
MARCH2nd week	1	**First Law of Thermodynamics:** Differential form of the First Law of Thermodynamics, Application of the first law for (i) Cyclic Process	CRS
	2	**Maxwell's Thermodynamic Relations**: Maxwell's thermodynamic relations (using Thermodynamic potentials),	CRS
	3	mass - expression for carrier concentration of electrons - electrical conductivity and problems.	CRS
	4	Basic concepts of feedback and virtual ground,	NJ
MARCH 3rd week	1	(ii) Adiabatic Process (iii) Isochoric Process (iv) Isobaric Process and (v) Isothermal Process. Equation of state for an adiabatic process (derivation)	CRS
	2	Applications of Maxwell's Relations (1) Gibbs potential, First order Phase Transitions with examples,	CRS
	3	Extrinsic semiconductors and electrical conductivity (qualitative), p-n junction and its characteristics	CRS
	4	Inverting and Non-Inverting Configurations.	NJ
MARCH 4th week and APRIL1st 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);	CRS
	2	(2) Clausius – Clapeyron Equation. and problems	CRS
	3	Zener diode as voltage regulator- load and line regulation.	NJ
	4	Applications- Voltage Follower, Addition and Subtraction.	NJ

APRIL 2nd week	1	Reversible and irreversible processes with examples; Heat engines: Carnot Engine; Carnot Cycle and its efficiency(derivation),	NJ
	2	Joule-Thomson effect, Liquefaction of gases, Linde's air liquefier .	CRS
	3	**Junction Transistors**: Basics of Bipolar Junction Transistors (BJT), BJT operation,.	NJ
	4	**Digital Electronics:** Analog and Digital circuits, Switching and Logic Levels,	NJ
APRIL 3rd week	1	Practical internal combustion engines - Otto and Diesel Cycles Cycles Carnot theorem, (qualitative treatment); Refrigerator- Coefficient of performance	NJ
	2	**Kinetic Theory of Gases**: Maxwell's law of distribution of velocity (without derivation), Deduction of most probable velocity	CRS
	3	Common Base, Common Emitter and Common Collector Characteristics	CRS
	4	Digital Waveform. Number Systems: Decimal Number System, Binary Number System,	CRS
APRIL4th week	1	Concept of Entropy, Second Law of Thermodynamics in terms of Entropy, Entropy in reversible process, Entropy in irreversible processes	NJ
	2	mean velocity and root mean square velocity, Degrees of Freedom,	NJ
	3	Field Effect Transistor (FET) and its characteristics	NJ
	4	Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary.	NJ
APRIL5th week and MAY 1st week	1	test	CRS
	2	test	CRS
	3	test	CRS
	4	test	NJ
MAY2nd week	1	Principle of increase of entropy, Entropy change in (i) adiabatic process (ii) free expansion (iii) cyclic process (iv) isobaric process	NJ
	2	Law of Equipartition of Energy. Derivation of Specific heats of ideal gas.	NJ
	3	Transistor as a CE-Amplifier (qualitative)	CRS
	4	**Digital Circuits**: Logic gates, NOT Gate, AND Gate, OR Gate, NAND Gate,	CRS
	2	**Black body radiation** and its spectral energy distribution; Kirchhoff's law, Stefan's law and Stefan-Boltzmann's law,	CRS
	3	problems	CRS
	4	NOR Gate, XOR Gate, Algebraic Simplification, De Morgan's theorem,	NJ
MAY3RD week	1	Problems	NJ
	2	Gravitation: Law of Gravitation, Motion of a particle in a central force field Satellite in a circular orbit	CRS
	3	Oscillator (Phase shift) problems	NJ
	4	Realisation of NAND and NOR functions using TTL	NJ
MAY4th week	1	revision	CRS

	2	Wien's displacement law, Rayleigh-Jeans law (Statements), Planck's law (derivation)– deduction of Wien's Law & Rayleigh – Jeans Law	
	3	revision	
	4	revision	
	1	Question bank discussion	
	2	Question bank discussion	
	3	Question bank discussion	
	4	Question bank discussion	