S.R.I.S.T (LESSON PLAN)

NAME OF THE FACULTY: BISWAJIT CHAKRABORTY **TRADE: ME**
YEAR: 2ND SEM: 3RD

SUBJECT: THERMAL ENGINEERING - I

PERIOD	TOPIC	REMARKS
6	**SOURCES OF ENERGY** Brief description of energy sources, including Classification of energy sources. Renewable and Non-Renewable sources of energy. Conventional and Non-Conventional sources of energy. Brief description on available form of energy, conversion to useful form and its application. Fossil fuels, including CNG, LPG. Solar energy, including Flat plate and concentrating collectors. Solar Water Heater. Photovoltaic Cell, Solar Distillation. Wind energy, Tidal energy, Geothermal energy. Biomass energy, including Biogas, Bio-diesel. Hydroelectric energy, Nuclear energy Fuel cell	
10	**FUNDAMENTALS OF THERMODYNAMICS** **Fundamental concepts of the following:** Pure substance. System, Boundary, Surrounding. Classification of system, including open system, closed system, isolated system. Properties of system, including Intrinsic and Extrinsic properties with units and its conversion like Pressure (Atmospheric Pressure, Gauge Pressure and Absolute pressure), Volume, Sp-mass and Temperature. State of a system, change of state, Path, Process.	

	Equilibrium of a system, including Mechanical, Thermal, Chemical and Thermodynamic equilibrium. Cycle, including Thermodynamic cycle and Mechanical cycle. S.T.P and N.T.P. **Energy:** Definition and units of Transient energy (Work and Heat), Stored energy (P.E., K.E and Internal energy), Point Function & Path Function. Displacement work & Flow work. Definition & units of Power. Definition and units of Enthalpy. Definition of Specific heat, Specific heat at constant pressure (Cp), Specific heat at constant volume (Cv) and Adiabatic Index (Cp/Cv). **Laws of Thermodynamics and their Application:** Zeroth Law of Thermodynamics and Temperature measurement. Principle of Energy Conservation. First law of Thermodynamics, Simple Energy Equation for non-flow process (Q - W) = _E, Steady Flow Energy Equation and its application to system like boiler, nozzle, turbine, compressor & condenser (Simple numerical), Concept of Perpetual Motion Machine of 1st kind, limitations of First law of Thermodynamics. Second Law of Thermodynamics: Kelvin – Plank Statement & Clausius' Statement, Heat Engine, Heat Pump and Refrigerator, Thermal Efficiency, C.O.P., Concept of Perpetual Motion Machine of 2nd kind, definition and units of Entropy.	
10	**PROPERTIES OF GASES** Definition and comparison of Ideal Gas & Real Gas. Charle's Law, Boyle's Law and Avogadro's Law, Equation of State (PV=mRT), Characteristic Gas Constant and Universal Gas Constant. Relation among two Specific Heats (Cp & Cv) with Characteristic Gas Constant. Ideal gas processes: Governing equation of processes (Pressure & Volume relations), Representation of the processes on P-V and T-S diagram, Deduce the expression to calculate Work transfer, Heat Transfer, Change of I.E., change of enthalpy and Change of Entropy for the following Processes: Constant Pressure Process, Constant volume Process, Constant temperature Process, Adiabatic Process & Polytropic Process (Simple numerical on Processes).	
10	**PROPERTIES OF STEAM** Explanation of steam generation process with the help of P-V & T-S diagram. Basic terms & properties of steam: Saturation Temperature, Saturation Pressure, Saturated liquid, Dry Saturated Steam, Wet Saturated Steam, Saturated steam, Superheated Steam, Critical Temperature, Dryness Fraction, Degree of Superheat, Sensible Heat, Enthalpy of Evaporation or Latent Heat of Evaporation, Enthalpy of Steam, Specific Volume, Entropy of Steam. (Simple numerical)	

	Steam Table & its use, Enthalpy- Entropy diagram of steam (Mollier Chart) and its use. Measurement of dryness fraction: Throttling process, Steam Calorimeters, Types and Principle for calculation of Dryness Fraction of Steam using a) Throttling Calorimeter, & b) Combined Separating & Throttling Calorimeter (Simple numerical). Comparison of Gas & Vapour Vapour Processes: Constant Pressure, Constant Volume, Constant Entropy & Constant Temperature processes and representation of the processes on P-V, T-S & H-S diagram,(Simple numerical using Steam Table and Mollier Chart)	
10	**BASIC OF HEAT TRANSFER** Explanation of Three Basic Modes of Heat Transfer (Conduction, Convection and Radiation). Fourier's Law of heat conduction, Thermal Conductivity and concept of Thermal Resistance. Heat Transfer through Plane Homogeneous Wall, Heat Transfer through Composite Wall, Heat Transfer through Hollow Cylinder and Heat Transfer through combined Conduction and Convection (Simple numerical). Stefan-Boltzmann Law of heat radiation with explanation of terms with unit. (No numerical) Definition and inter relation of Absorptive, Reflectivity and Transmissivity Concept of Black and Gray Bodies. Principle of heat exchanger, Construction, working principle and application of Shell and Tube, Plate Type, Multiphase Heat Exchangers. (No deduction and numerical)	