Subject : Heat and Material Properties No. of hours: 2Theo. 4 Unit	
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Contents	No. of hours
Chapter One : Temperature Temperature, Principles of temperature measurement, Temperature scales, Conversion of scales, Types of thermometers, Calibrations of the thermometers, Constant volume gas thermometer, Thermocouple thermometer, Electrical resistance thermometer, Effect of temperature changes on material states, Thermal expansion, Expansion of solids, Expansion of liquid, Expansion of gases, Mechanism of heat transfer, Conduction method, Convection method, Radiation method, Low temperature, The relation between material and energy, Source of thermal energy, Examples, Exercises.	8
Chapter Two : Heat Heat and its effects, Quantity of heat. The specific heat, Specific heat measurement's methods, Concept of phase, Phase transformations. Phase diagram, Water triple point, Material state transformation, The evaporation, The melting, The boiling, The sublimation, First law of thermodynamics, Applications on the first law of thermodynamics, Examples, Exercises.	6
Chapter Three : Gases Ideal and real gas, The kinetic theory of gases, Avogadro's number, Gas law, Boyle's law, Charle's law, The gas constant, The ideal gas law, Vander Weal's equation, The potential energy of gas, The specific heat of gases, Relation between C_p and C_v , Evaluation of C_p and C_v for ideal gases, The work done by the ideal gas, The ideal gas pressure, Examples, Exercises.	5

Chapter Four : The Liquids	
The density, Specific weight, The capillarity, The surface tension, The liquid surface, The angle of contact, Viscosity, The pressure in liquids, Pascal principle, Archimedes principle, The steady flow, Poiseuille's law, Bernoulli's equation, Flow-meters, Venturi-meter, Pitot tube, Torricelli's equation, Examples, Exercises.	10
Chapter Five : The mechanical properties of materials	
 Stress, Types of stress, Strain, Types of strain, Stress-strain curve, Kind of strain, Modulus of elasticty, Young's Modulus, Determination of young modulus, Poisson's ratio, Determination of Poisson's ratio, The relation between mechanical properties and temperature, The effect of temperature on all properties, Heat treatment at high and low temperatures, Examples, Exercises. 	7
Chapter Six : The magnetic properties of materials	
The magnetic moment of electron, The angular momentum of electron, The relation between μ and L, The magnetic susceptibility, Classification of magnetic materials, The diamagnetic, The paramagnetic, The ferromagnetic, The anti-ferromagnetic, The ferrimagnetic, The magnetic elements, Exercises.	6
Chapter Seven : The electrical properties of materials	
The electrical conductivity, Insulators, Conductors, Semiconductors, Electrical resistivity, Electrical conductivity and temperature, The superconductivity, The critical field, Thermal electrical breakdown, The effective factors on electrical breakdown, Exercises.	6
Chapter Eight : Plasma	
Plasma, Plasma production, Investigation of plasma, Plasma and magnetic fields, Confinement of plasma, The earth magnetic field and the solar plasma, Questions.	1

1. الحرارة وخواص المادة. (د.كاظم احمد).

2. الثرموداينمك. (د.سامي مظلوم ، د. امجد كرجية ، د. عبد اللطيف ابراهيم)

3. الفيزياء لطلبة علوم الارض. (فاروق عبودي ، د.مؤيد عبد الله ، د.مازن فضيل)

- 4. Mechanic, Heat and Sound, Sears
- 5. Physics(part 1), RResuich and D.Halliday

المراجع