

# PHYSICS FOR CHEMISTRY-I

Allied Course for II B. Sc. (Chemistry) (For students admitted from June 2007)

<b>Semester -III</b>	<b>Code: 081PY3A01</b>	<b>Hours/week: 4</b>	<b>Credits: 2</b>
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## **Unit1: Thermodynamics and low temperature physics**

Zeroth law, First law and Second law of thermodynamics-Latent heat equation-Effect of pressure on B.P. and M.P.-Internal and external latent heats-Otto and Diesel engine-Expressions for efficiency. Joule Kelvin effect-Temperature of inversion-Liquefaction of air by Linde's process-Liquefaction of Helium by K Onnes method - Helium I and Helium II - Adiabatic demagnetization.

## **Unit 2: Low pressure physics and Elasticity**

Low pressure: Production of Low pressure-Exhaust pumps-Characteristics of exhaust pumps-Air pump-Diffusion pump-Waran's pump-Measurement of low pressure-McLeod gauge-Pirani gauge. Elasticity: Definition for three moduli of elasticity - Poisson's ratio - Bending of beams - Expression for bending moment - Experimental determination of Young's modulus by cantilever, uniform and non-uniform bending with necessary theory - Twisting couple on a rod - Expression for couple per unit twist - Experimental determination of Rigidity modulus by Torsion pendulum with theory.

## **Unit 3: Properties of matter**

Viscosity: Coefficient of viscosity-Streamline flow and turbulent flow-Reynold's number-Critical velocity-Poiseuille's equation for flow of liquid through a tube-Experimental determination of viscosity (Variable pressure head).

Surface tension: Explanation of surface tension-Surface energy and Surface tension-Excess pressure inside a drop and bubble-Surface tension by Jaegar's method-Drop weight method-Surfactants.

Compressibility - Definition - Production of ultrasound - Piezo-electric effect -Determination of velocity and compressibility of liquid using ultra sound.

## **Unit 4: Chemical effect of current & Thermoelectricity**

Faraday's laws of electrolysis-Primary cell-Secondary cell-Lead acid accumulator, Nickel-Iron accumulator-Standard cells-Weston cadmium cell-Gibb's-Helmholtz equation for emf of a reversible cell.

Seebeck effect-Measurement of thermo emf of a thermocouple using potentiometer-Peltier effect-Thomson effect-Expression for Peltier and Thomson Coefficients.

## **Unit 5: Semiconductor devices**

Junction diode-Zener diode-Avalanche and Zener breakdown-Voltage regulation using Zener diode & three terminal IC 7805.

Bipolar transistor: The BJT action-Basic configuration-CE characteristics-Common emitter transistor amplifier(Single stage RC coupled amplifier)-Gain-Frequency response-Bandwidth-Input and output impedances.

Oscillators-Principle and Working of a Colpitt's and Hartley oscillator.

Field effect transistor: Structure and behavior of FET- Characteristics of an N-channel FET.

## **Unit 6: Integrated Electronics**

Operational amplifier - Salient features - Description and characteristics - Pin configuration of IC 741 - Applications of OPAMP IC 741 - Inverting and Non-inverting amplifier - Adder - Subtractor - D/A converter.

555 timer IC - Pin configuration -Astable and Monostable multivibrator circuits using 555.

### **Books for study:**

Brijlal and N.Subramaniam, Heat and Thermodynamics, S.Chand & Co New Delhi (2003).  
D.S. Mathur, Heat and Thermodynamics (Revised By M.N. Bapat), S. Chand & Sons (1993).  
D. S Mathur, Elements of Properties of matter- Shyamlal Charitable Trust, New Delhi (2001).  
M.Nagaratnam and N.Lakshminarayan, Electricity and Magnetism, 3rd revised edition The National Pub. Co.(1994).  
D.Chattopadhyay et al., Foundations of Electronics 2nd edition , Wiley Eastern Ltd. (1988) New Delhi.  
Ramakant A.Gayakwad, Op amps and linear integrated circuits 4th edition, Prentice Hall of India.  
D.Roy Choudhury and Shail Jain, Linear Integrated Circuits- New Age International (P) Ltd, Publishers.  
Robert Resnick and David Halliday, Fundamentals of Physics 6th edition, John Wiley & sons, Inc.  
H.C.Verma, Concepts of Physics volume 1&2, Bharathi Bhavan Publishers, New Delhi(Reprint 2006).