

# SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar-388120

**B.Sc. (Semester - 1)**

**Subject: Physics**

**Course: US01CPHY21**

**Mechanics-I, Network Analysis and Optics**

**(Four Credit Course –4 Hours per week)**

(Effect from June, 2018)

## **UNIT: 1          Elasticity**

Definitions of Load, Stress and Strain, Hooke's Law & Stress-strain diagram, Three types of elasticity, Work done per unit volume in elongation strain, Deformation of a cube- (Bulk modulus, Modulus of rigidity, Young modulus) , Relation connecting the elastic constants, Poisson's ratio, Limiting values of  $\sigma$ , Determination of Poisson's ratio for rubber, Twisting couple on a cylinder (or wire) ,Torsional pendulum, Determination of  $\eta$  – Statical method (Horizontal twisting apparatus for a rod), Maxwell's vibrating needle method, Bending of beams, Bending moment, The cantilever-when the weight of beam is ineffective, Depression of a beam supported at the ends-when the beam is loaded at the centre

## **UNIT: 2          Wave and Oscillations**

### **Ultrasonic waves**

Introduction, Generation of ultrasonics, Piezoelectric effect, Piezoelectric generator, advantages of Piezoelectric generator, Magnetostriction effect, Magnetostriction oscillator, advantages and disadvantages of Megnetostriction oscillator, Detection of ultrasonics, Properties of ultrasonics, Applications of ultrasonics

### **Simple Harmonic Motion**

Introduction to an acceleration due to gravity, The simple pendulum, Drawbacks of a simple pendulum, Compound pendulum, Centre of oscillation, Interchangeability of centers of suspension and oscillation, Centre of percussion, Other points, collinear with C.G. about which the time period is the same, Conditions for maximum and minimum time periods, Bar pendulum, Kater's reversible pendulum

## **UNIT: 3          Network Analysis and Bridge Circuits**

### **Elementary Network Theory**

Network terminology, Network analysis by mesh currents (two & three mesh network), Circuit analysis by Node-pair voltages (one & two node pair voltage method), Voltage divider theorem, Superposition theorem, Thevenin's theorem, Norton's theorem

### **Bridges and their application**

Introduction, Wheatstone bridge, Basic operation, Measurement errors, AC bridges and their application, Condition for bridge balance, Application of the Balance equation, Maxwell bridge, Schering bridge, Wien bridge

### **UNIT: 4 Optics**

#### **Interferometry**

Introduction to interference, Jamin's interferometer, Michelson's Interferometer; Types of fringes, white light fringes, Uses: measurement of wavelength of light of a monochromatic source, measurement of refractive index of a thin plate

#### **Resolving power of optical instruments**

Resolving power, Rayleigh's criterion; limit of resolution, R. P. of Telescope, R. P. of Microscope(light microscope), R.P. of diffraction Grating, R. P. of prism spectroscope

#### **Reference Books:**

1. Elements of Properties of Matter  
D.S.Matur  
S.Chand & Co., New Delhi
2. Engineering Physics  
K.Rajagopal  
PHI Learning Private Ltd. New Delhi
3. Principles of Electrical Engineering (2<sup>nd</sup> Edition)  
Vincet Del Toro  
PHI Learning Private Ltd. New Delhi
4. Electronic instrumentation and Measurement Techniques  
W. D. Cooper and A. D. Helfrick,  
Prentice-Hall of India private Ltd
5. A textbook of light  
D. N. Vasudeva,(10<sup>th</sup> Edition)  
Atma Ram & Sons, New Delhi